CALIBRATION AND SERVICING HANDBOOK

1065 & 1065A

datron INSTRUMENTS

digital multimeter

CALIBRATION AND SERVICING HANDBOOK

for

THE DATRON AUTOCAL 1065 and 1065A DIGITAL VOLTMETERS

(for operating procedures
refer to the User's Handbook)

850047 Issue 3 (NOV.83)

For any assistance contact your nearest Datron Sales and Service office.
Addresses can be found at the back of this handbook.

Due to our policy of continuously updating our products, this handbook may contain minor differences in specification, components and circuit design to the instrument actually supplied. Amendment sheets precisely matched to your instrument serial number are available on request.

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Refer to User's Handbook*

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SECTION 1

CALIBRATION

1.1 INTRODUCTION

1.1.1 General

The purpose of calibration is to take account of any long-term drifts in the components of the instrument and to restore the accuracy, traceable to a known standard.

The period between calibrations depends upon the accuracy performance required from the instrument and for guidance, guaranteed accuracies for 24 hours, 90 days and 1 year are quoted.

The calibration procedures presented in the following pages should cater for most calibration situations. If, however, a special problem arises, please contact our Customer Service Section.

1.1.2 The Essentials for Good Calibration

Temperature - So that the instrument can meet its specification over the quoted temperature range, the temperature environment should be stabilised at 23°C ±1°C. In addition, temperature gradients around the instrument should be considered, therefore calibrate the instrument in its normal operating position and allow plenty of room for ventilation.

Warm up - It is essential that the instrument has fully temperature stabilised if the best results from calibration are to be achieved. Therefore, at least a 2 hour warm-up period is recommended during which time the line supply or the covers should not be removed even for a short period. In addition, if the covers have been removed, make certain that they are correctly fitted and that the leaf contacts to the Earth and Guard Shields are in good shape.

Calibration Source - To perform a useful calibration the accuracy of the source should always be at least four times that of the instrument being calibrated. In most cases, examples of likely sources are given for each calibration function.

With some calibration sources, the output may take several seconds to settle to a final value, therefore unless a shorter settling time is assured, a period of 10 seconds is recommended before each calibration operation.

Guarding - It is preferable to arrange for the DVM to be calibrated with 'Guard' connected to 'Lo' at the DVM. Furthermore to arrange for the 'Lo' terminal of the DVM to remain at 'earth' throughout and let the calibration source float. If the front panel input terminals are used then 'Guard' is permanently connected to 'Lo' internally. If 'Rear' panel input is selected then 'Guard' can either be connected locally or remotely. If a remote guard connection is desirable then examples are shown in the User's Handbook.

1.1.3 The 'AUTOCAL' Process

1.1.3.1 General

The Datron 'AUTOCAL' process means that complete calibration of AC, DC and Ohms on every range can be carried out from the instrument's own front panel. In the process, an internal non-volatile memory stores calibration constants for each function and range as determined when the instrument takes a series of 16 readings of the applied calibration source. Internally, each of the readings is deviated by one sixteenth of a digit and when an average is taken, the instrument is able to resolve to better than one least significant digit displayed.

Access to the non-volatile memory is gained using a key inserted into the rear panel. When calibration is complete, the key is removed, therefore preventing accidental or unauthorised use of the calibration routine.

1.1.3.2 Procedure Outline

- Select the 'FUNCTION' and 'RANGE' to be calibrated.

- If the instrument is to be manually calibrated, set the rear panel address switch to 31, i.e. all 1's.

- Insert the key into the 'CALIBRATE ENABLE' keyswitch on the rear panel and turn to the 'CAL' position. (The 'Cal' legend will be displayed on the front panel, the operation of the keys in the 'MODE' group changes to that indicated above the keys and the 'MODE' functions are automatically cancelled).

- Connect the calibration source to the input terminals and operate the keys shown in the tables in the following pages. When a calibration key in the 'MODE' group is operated, its associated L.E.D. indication will light and will go out when the calibration operation is executed.

- When all calibration is complete, turn the keyswitch to 'RUN' and remove the key.

1.1.3.3 The Five Calibration Keys

When the instrument is in the calibration mode of operation, as described in the procedure outlined above, the five keys in the front panel 'MODE' group operate as labelled above the keys.

'Zero' - This takes account of offsets in the instrument and in the calibration source.

'Gain' - This sets a scaling factor for each range and function.

'AcHf' - This flattens the response of the A.C. amplifier used for AC voltage measurement. It should only be used when a full calibration i.e. 'Zero', 'Gain' and 'AcHf' is carried out. The calibration action is iterative and requires several operations of the key to complete.

'Lin' - This is an important calibration operation as it optimises the basic linearity of the internal measurement circuitry used for all ranges and functions. It must be used before any DC voltage or Ohms calibration is carried out.

'Keyboard' - This is an extension of the 'AUTOCAL' process which is useful when using a calibration source set to a nominal value but with known errors. This means for example that calibration directly to a standard cell is possible. A full explanation of the procedure is covered in section 1.5.

1.1.3.5 'AUTOCAL' over the Bus

Each of the five calibration operations can be controlled using the IEEE bus. This means that the instrument can be entirely calibrated remotely or under program control. As mentioned in the 'Procedure Outline' for a manual calibration, the rear panel address switch should be set to 31, i.e. all 1's. When a bus calibration is required the address switch must be set to the address number assigned to the DVM in the system. More details of calibration with the bus are included in section 1.6.

1.1.3.6 'Err 4'

If during calibration 'Err 4' is displayed, this indicates that the Calibration Source deviates too far from the calibration span of the instrument. Under these circumstances, the calibration memory is not updated and the calibration key LED remains on.

In the case of 'Zero', 'Gain' or 'AcHf' the Calibration Source should be checked and the same Calibration key repressed. If 'Err 4' follows 'Lin' or persistently appears following 'Zero', 'Gain' or 'AcHf' then an instrument failure may have occurred. Therefore either consult our Customer Service Section or the Servicing Section of this Handbook.

1.2 DC VOLTAGE CALIBRATION

1.2.1 General

The procedure in the tables opposite is all that is necessary to completely 'AUTOCAL' the DC voltage function. Steps 1 and 2 affect the accuracy on all ranges and should therefore be carried out even if just one range is being calibrated.

On each range a 'Zero' and 'Gain' calibration is required for each polarity of input. The two 'Zero' calibrations are included to overcome a possible zero difference with the polarity setting of the DC calibration source.

If the 'DVM Reading After Calibration' is not in accordance with the table, repeat operations of the same Calibrate key are permissible. Where no tolerance is shown in this column, only the exact reading quoted with an occasional least significant digit showing is to be expected.

1.2.2 Equipment Required

- A copper shorting link.

- A DC Calibration Source. e.g. — Datron 4000 Autocal Standard.

1.2.3 Checking Accuracy after 'AUTOCAL'

To check the accuracy after 'AUTOCAL' the 'Specification Verification' section of the User's Handbook will be useful; it provides tables for quick reference of accuracy on all ranges and functions in displayed digits.

5½ DIGIT

Step	Calibration Operation	Calibration Source Output	DVM Setting	Calibrate Key	DVM Reading After Calibration	Remarks
1	Linearity	Copper shorting link	DC,10 Filter	'Lin'	<10 digits	This calibration step may take around 30 seconds to complete
2	10V Range Zero	+0.0000V	DC,10	'Zero'	±0.0000V	
3	10V Positive Full Range	+10.0000V	DC,10	'Gain'	+10.0000V	
4	10V Range Zero	−0.0000V	DC,10	'Zero'	±0.0000V	
5	10V Negative Full Range	−10.0000V	DC,10	'Gain'	−10.0000V	
6	1V Range Zero	+0.00000V	DC,1	'Zero'	±.00000V	
7	1V Positive Full Range	+1.00000V	DC,1	'Gain'	+1.00000V	
8	1V Range Zero	−0.00000V	DC,1	'Zero'	±.00000V	
9	1V Negative Full Range	−1.00000V	DC,1	'Gain'	−1.00000V	
10	.1V Range Zero	+0.000mV	DC,.1	'Zero'	±0.000mV ±1 digit	Wait for the reading to stabilize before operating 'Zero'
11	.1V Positive Full Range	+100.000mV	DC,.1	'Gain'	+100.000V ±1 digit	
12	.1V Range Zero	−0.000mV	DC,.1	'Zero'	±0.000mV ±1 digit	Wait for the reading to stabilize before operating 'Zero'
13	.1V Negative Full Range	−100.000mV	DC,.1	'Gain'	−100.000V ±1 digit	
14	100V Range Zero	+0.000V	DC,100	'Zero'	±0.000V	
15	100V Positive Full Range	+100.000V	DC,100	'Gain'	+100.000V	
16	100V Range Zero	−0.000V	DC,100	'Zero'	±0.000V	
17	100V Negative Full Range	−100.000V	DC,100	'Gain'	−100.000V	
18	1000V Range Zero	+0.00V	DC,1000	'Zero'	±0.00V	
19	1000V Positive Full Range	+1000.00V	DC,1000	'Gain'	+1000.00V	ϟ Lethal voltages present - increase calibration source in 100V steps if possible
20	1000V Range Zero	−0.00V	DC,1000	'Zero'	±0.00V	
21	1000V Negative Full Range	−1000.00V	DC,1000	'Gain'	−1000.00V	ϟ Lethal voltages present - increase calibration source in 100V steps if possible

ALIBRATION

6½ DIGIT (1065A only – "Filter" selected)

Step	Calibration Operation	Calibration Source Output	DVM Setting	Calibrate Key	DVM Reading After Calibration	Remarks
1	Linearity	Copper shorting link	DC,10 Filter	'Lin'	< 100 digits	This calibration step may take around 30 seconds to complete
2	10V Range Zero	+0.0000V	DC,10 Filter	'Zero'	±0.00000V ±4 digits	
3	10V Positive Full Range	+10.0000V	DC,10 Filter	'Gain'	+10.00000V ±4 digits	
4	10V Range Zero	–0.0000V	DC,10 Filter	'Zero'	±0.00000V ±4 digits	
5	10V Negative Full Range	–10.0000V	DC,10 Filter	'Gain'	–10.00000V ±4 digits	
6	1V Range Zero	+0.00000V	DC,1 Filter	'Zero'	±.000000V ±4 digits	
7	1V Positive Full Range	+1.00000V	DC,1 Filter	'Gain'	+1.000000 ±4 digits	
8	1V Range Zero	–0.00000V	DC,1 Filter	'Zero'	±.000000V ±4 digits	
9	1V Negative Full Range	–1.00000V	DC,1 Filter	'Gain'	–1.000000V ±4 digits	
10	.1V Range Zero	+0.000mV	DC,.1 Filter	'Zero'	±0.0000mV ±10 digits	Wait for the reading to stabilize before operating 'Zero'
11	.1V Positive Full Range	+100.000mV	DC,.1 Filter	'Gain'	+100.0000mV ±10 digits	
12	.1V Range Zero	–0.000mV	DC,.1 Filter	'Zero'	±0.0000mV ±10 digits	Wait for the reading to stabilize before operating 'Zero'
13	.1V Negative Full Range	–100.000mV	DC,.1 Filter	'Gain'	–100.0000mV ±10 digits	
14	100V Range Zero	+0.000V	DC,100 Filter	'Zero'	±0.0000V ±4 digits	
15	100V Positive Full Range	+100.000V	DC,100 Filter	'Gain'	+100.0000V ±10 digits	
16	100V Range Zero	–0.000V	DC,100 Filter	'Zero'	±0.0000V ±4 digits	
17	100V Negative Full Range	–100.000V	DC,100 Filter	'Gain'	–100.0000V ±10 digits	
18	1000V Range Zero	+0.00V	DC,1000 Filter	'Zero'	±0.000V ±4 digits	
19	1000V Positive Full Range	+1000.00V	DC,1000 Filter	'Gain'	+1000.000V ±10 digits	Lethal voltages present - increase calibration source in 100V steps if possible
20	1000V Range Zero	–0.00V	DC,1000 Filter	'Zero'	±0.000V ±4 digits	
21	1000V Negative Full Range	–1000.00V	DC,1000 Filter	'Gain'	–1000.000V ±10 digits	Lethal voltages present - increase calibration source in 100V steps if possible

5½ DIGIT

Step	Calibration Operation	Calibration Source	DVM Setting	Calibrate Key	DVM Reading After Calibration	Remarks
1	.1kΩ Range Zero	4 wire zero	kΩ, .1	'Zero'	±0.000Ω	Wait for the reading to stabilize before operating 'Zero'
2	.1kΩ Full Range	100Ω [1] Standard Resistor	kΩ, .1	'Gain'	100.000Ω	Wait for the reading to stabilize before operating 'Gain'
3	1kΩ Range Zero	4 wire zero	kΩ, 1	'Zero'	±.00000kΩ	
4	1kΩ Full Range	1kΩ [1] Standard Resistor	kΩ, 1	'Gain'	1.00000kΩ	
5	10kΩ Range Zero	4 wire zero	kΩ, 10	'Zero'	±0.0000kΩ	
6	10kΩ Full Range	10kΩ [1] Standard Resistor	kΩ, 10	'Gain'	10.0000kΩ	
7	100kΩ Range Zero	4 wire zero	kΩ, 100	'Zero'	±0.000kΩ	
8	100kΩ Full Range	100kΩ [1] Standard Resistor	kΩ, 100	'Gain'	100.000kΩ	
9	1000kΩ Range Zero	4 wire zero	kΩ, 1000, Filter	'Zero'	±0.00kΩ	
10	1000kΩ Full Range	1000kΩ [1] Standard Resistor	kΩ, 1000, Filter	'Gain'	1000.00kΩ ±3 digits	
11	10MΩ Range Zero	4 wire zero	kΩ, 10MΩ, Filter	'Zero'	±0.0000MΩ	
12	10MΩ Full Range	10MΩ [1] Standard Resistor	kΩ, 10MΩ, Filter	'Gain'	10.0000MΩ ±5 digits	

[1] - With Standard Resistor sources it may be useful to use the 'Keyboard' method of calibration - see section 1.5

ION TABLE

6½ DIGIT (1065A only — "Filter" selected)

Step	Calibration Operation	Calibration Source	DVM Setting	Calibrate Key	DVM Reading After Calibration	Remarks
1	.1kΩ Range Zero	4 wire zero	kΩ, .1 Filter	'Zero'	±0.0000Ω ±10 digits	Wait for the reading to stabilize before operating 'Zero'
2	.1kΩ Full Range	100Ω [1] Standard Resistor	kΩ, .1 Filter	'Gain'	100.0000Ω ±10 digits	Wait for the reading to stabilize before operating 'Gain'
3	1kΩ Range Zero	4 wire zero	kΩ, 1 Filter	'Zero'	±.000000kΩ ±4 digits	
4	1kΩ Full Range	1kΩ [1] Standard Resistor	kΩ, 1 Filter	'Gain'	1.000000kΩ ±4 digits	
5	10kΩ Range Zero	4 wire zero	kΩ, 10 Filter	'Zero'	±0.00000kΩ ±4 digits	
6	10kΩ Full Range	10kΩ [1] Standard Resistor	kΩ, 10 Filter	'Gain'	10.00000kΩ ±4 digits	
7	100kΩ Range Zero	4 wire zero	kΩ, 100 Filter	'Zero'	±0.0000kΩ ±4 digits	
8	100kΩ Full Range	100kΩ [1] Standard Resistor	kΩ, 100 Filter	'Gain'	100.0000kΩ ±10 digits	
9	1000kΩ Range Zero	4 wire zero	kΩ, 1000, Filter	'Zero'	±0.000kΩ ±4 digits	
10	1000kΩ Full Range	1000kΩ [1] Standard Resistor	kΩ, 1000, Filter	'Gain'	1000.000kΩ ±30 digits	
11	10MΩ Range Zero	4 wire zero	kΩ, 10MΩ, Filter	'Zero'	±0.00000MΩ ±4 digits	
12	10MΩ Full Range	10MΩ [1] Standard Resistor	kΩ, 10MΩ, Filter	'Gain'	10.00000MΩ ±50 digits	

[1] - With Standard Resistor sources it may be useful to use the 'Keyboard' method of calibration - see section 1.5

1.4 AC VOLTAGE CALIBRATION

1.4.1 General

The procedure in the table opposite is all that is necessary to completely 'AUTOCAL' the AC voltage function. On each range just a 'Zero', 'Gain' and 'AcHf' calibration is required.

If the 'DVM Reading After Calibration' is not in accordance with the table, repeat operation of the same Calibration key is permissible to improve the readings. This will be necessary with the AcHf key.

1.4.2 Equipment Required

A copper shorting link and an AC calibration source e.g. Fluke 5200A and 5215A.

1.4.3 Checking Accuracy after 'AUTOCAL'

To check the accuracy after 'AUTOCAL' the 'Specification Verification' section of the User's Handbook will be useful. It provides tables for quick reference of accuracy on all ranges and functions in displayed digits.

AC VOLTAGE CALIBRATION TABLE

Step	Calibration Operation	Calibration Source Output	DVM Setting	Calibrate Key	DVM Reading After Calibration	Remarks
1	1V Range Zero	Copper shorting link	AC,1	'Zero'	.00000V ±1 digit	Do not select 'Filter'. Wait for reading to stabilize before operating 'Zero'
2	10V Range Zero	Copper shorting link	AC,10	'Zero'	0.0000V ±1 digit	
3	100V Range Zero	Copper shorting link	AC,100	'Zero'	0.000V ±1 digit	
4	1000V Range Zero	Copper shorting link	AC,1000	'Zero'	0.00V ±1 digit	
5	10V Full Range LF	10V rms 500 Hz	AC,10, Filter	'Gain'	10.0000V ±1 digit	Select 'Filter for remaining steps
6	10V Full Range HF	10V rms 30 kHz	AC,10, Filter	'AcHf'	10.0000V ±10 digits	
7	1V Full Range LF	1V rms 500Hz	AC,1, Filter	'Gain'	1.00000V ±1 digit	
8	1V Full Range HF	1V rms 30 kHz	AC,1, Filter	'AcHf'	1.00000V ±10 digits	
9	100V Full Range LF	100V rms 500 Hz	AC,100, Filter	'Gain'	100.000V ±1 digit	
10	100V Full Range HF	100V rms 30 kHz	AC,100, Filter	'AcHf'	100.000V ±10 digits	
11	1000V Full Range LF	1000V rms 500 Hz	AC,1000, Filter	'Gain'	1000.00V ±1 digit	ϟ Lethal voltage present - increase calibration source in 100V steps if possible
12	1000V Full Range HF	1000V rms 10 kHz	AC,1000, Filter	'AcHf'	1000.00V ±20 digits	ϟ Lethal voltage present - increase calibration source in 100V steps if possible. DO NOT EXCEED 25 kHz

1.5 CALIBRATION USING 'Keyboard'

1.5.1 General

The 'Keyboard' method of calibration is useful when a calibration source although set to a nominal value has known errors. In this situation the known value of the calibration source can be entered into the DVM before the 'AUTOCAL' process is executed. The process is functional during any calibration with a source of magnitude between 20% and 200% of the range selected, but it should be noted that for equal magnitude source errors, calibrating at the lower percentage end of range produces a higher percentage calibration error. The 'Keyboard' method operates for both the 'Gain' and AcHf' calibration operations. An example using 'Keyboard' to calibrate directly against a Standard Cell is shown in the table below.

When 'Keyboard' is selected the operation of the 'RANGE', 'INPUT' and 'FUNCTION' keys changes to the numeric, decimal point, polarity and clear labels shown on the front of the instrument.

1.5.2 'Keyboard' with Negative Inputs

If the 'KEYBOARD' method is used on DC Voltage calibration with Negative polarity sources, it is important NOT to enter a negative sign with the keyed-in source value. The instrument itself can determine the polarity of the source and update the appropriate calibration memory location.

CALIBRATION EXAMPLE USING 'KEYBOARD'

Step	Calibration Operation	Calibration Source Setting	DVM Setting	Calibrate Key	DVM Reading After Calibration	Remarks
1	1V Range Zero	Short-circuit	DC,1	'Zero'	±.00000V	Short connecting leads at Standard Cell end
2	Connect Standard Cell	Standard Cell	'Keyboard'	–	0	
3	Enter Standard Cell Voltage	Standard Cell	1,˙,0,1,8,1,6	–	+1.01816	
4	1V Range Calibration	Standard Cell	–	'Gain'	+1.01816	

1.6 'AUTOCAL' OVER THE BUS

All the calibration procedures covered in this handbook can be carried out remotely using the IEEE Bus.

Effectively, the five calibration keys are replaced by five Bus instructions and these are used instead of the Calibration keys listed in the Calibration tables on previous pages.

An example of calibration with the Bus is given in the table below. A complete program listing for the same calibration operation assuming an HP9825 controller is as follows:—

```
Ø: dim D$[15]                    define 15 character string
                                 variable
1:  clr 728                      send 'device clear' to DVM
                                 (interface 7, address 28)
2: wrt 728,"F3R3Q1W1="           program to DC 1V, SRQ
                                 Mode 1, Enable Cal.
3: Ø→S
4: wrt 728,"GØ="                 program zero cal. trigger
5: oni 7,"srq"                   jump to SRQ service routine
                                 on interrupt
6: eir 7,128                     enable SRQ interrupts from
                                 interface 7
7: if bit ("Ø1XXXXXX",S)         check status byte S
   =Ø;jmp -1                     obtained by service routine
8: dsp "Apply 1V &               prompt operator to apply
   CONTINUE"                     calibration source on com-
                                 pleting zero cal
9: Ø→S;stp
10: wrt 728,"G1="                program gain cal. trigger
11: oni 7,"srq"
12: eir 7,128
13: if bit ("Ø1XXXXXX",S)
   =Ø;jmp -1
14: wrt 728,"TØWØ="              program to Internal Trigger,
                                 Disable Cal. on completion
                                 of gain cal.
15: lcl 728                      program DVM to local state
16: stp
17: "srq":rds(728)→S             SRQ service routine to read
                                 status byte
18: red 728,D$
19: iret
*7717
```

CALIBRATION EXAMPLE USING THE BUS

Step	Calibration Operation	Calibration Source	DVM Setting	Bus Controller Instruction	DVM Reading After Calibration	Remarks
1	Set DVM to known state	—	In Remote State	'Device Clear'	—	Program DVM to predetermined state CØDXEØF3NØ OØQØRSØT1
2	Set DVM to DCV, 1V Range, and prepare for calibration	+0.00000V	Calibration key to 'CAL'	'F3R3Q1W1='	—	Program DVM to Function: DC V(F3) Range: 1V (R3) SRQ Mode 1 (Q1) Enable Cal. (W1)
3	1V Range Zero	+0.00000V	In Remote State	'GØ='	±.00000V	Program 'Zero' cal., SRQ indicates when calibration operation completed
4	1V Positive Full Range	+1.00000V	In Remote State	'G1='	+1.00000V	Program 'Gain' cal., SRQ indicates when calibration operation completed
5	Set DVM to Internal Trigger, Disable Cal.	—	In Remote State	'TØWØ='	—	Program DVM to Internal Trigger (TØ), Disable Cal. (WØ)
6	—	—	In Local State, Calibration key to 'RUN'	'Local'	—	DVM in normal mode, free-running

SECTION 2

MECHANICAL DESCRIPTION

2.1 GENERAL

The 1065 has been designed to be either rack mounted in a standard 19" rack (3½" (2U) height required) or bench top/portable with integral tilt stand. An exploded view of the instrument is shown in Fig. 2.1.

2.2 FRONT PANEL

The front panel incorporates the signal input terminals, input, function, mode and power switches and a numeric/legend gas discharge display.

2.3 REAR PANEL

The rear panel incorporates the power cable input plug and fuse, the IEEE Bus connector and address selection switch, the rear signal input plug, the run/calibrate key-switch and the calibration interval select switch.

2.4 EXTERNAL CONSTRUCTION

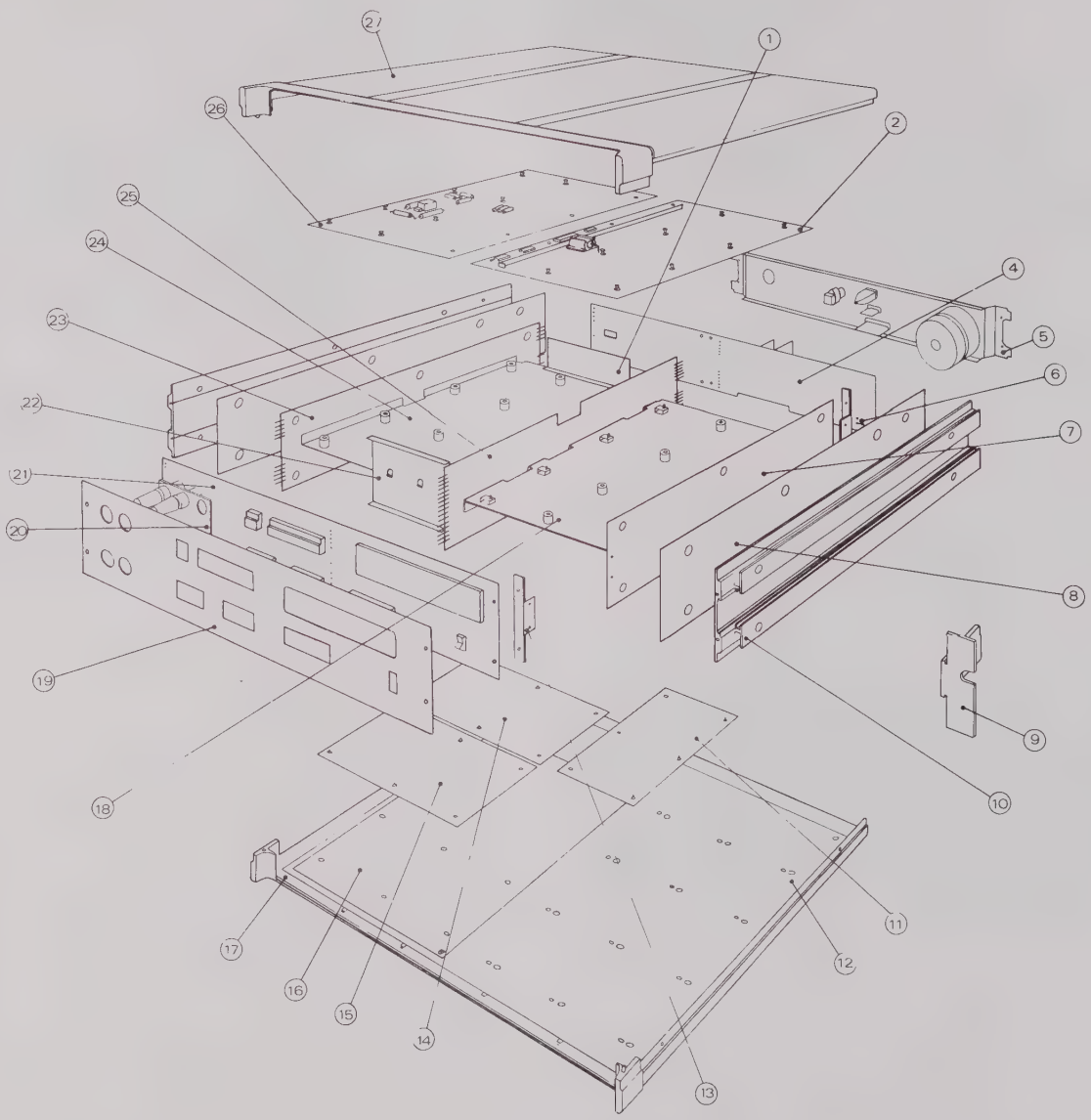
An overlay adheres to the front panel, it labels the keys and retains a polarising filter in front of the display. Both the front and rear panels are held together by two side extrusions running from front to rear. These provide slots for the rack mounting 'ears' and locating points for the structural foam covers. The bottom cover is fitted with a tilt-stand and rubber feet. Earth screening of the covers and guarding is provided by aluminium plates, heat-staked to the inside of the covers with electrical connections made by spring contacts.

2.5 INTERNAL CONSTRUCTION

An internal chassis is constructed from four printed circuit boards, held together by connectors at each corner and held rigid by two inner aluminium shields fixed horizontally on the instrument's centre line running from front to rear. Input terminals, switches and display are mounted on the front printed circuit board (pcb) and the power supply on the rear pcb. The side and centre pcb's are used for interconnections between the main circuit boards.

All the main circuit boards are mounted on the inner shields with hinges and quick release fasteners with flexible connections to allow operation in the 'hinged-up' position.

The chassis is mounted on to the side extrusions with nylon screws, spacers and an insulation sheet to ensure that the 'electrical spacings' of the BSI, UL and VDE specifications are achieved.



1. REAR GUARD SCREEN
2. DIGITAL ASSEMBLY
4. REAR (POWER SUPPLY & REAR INPUT) PCB ASSEMBLY
5. REAR PANEL ASSEMBLY
6. POWER SUPPLY VOLTAGE SELECTION LINKS
7. R.H. SIDE PANEL
8. INSULATION SHEET
9. RACK MOUNTING BRACKET
10. SIDE EXTRUSION
11. DIGITAL INTERFACE ASSEMBLY
12. EARTH SCREEN
13. MOUNTING BRACKET
14. AC ASSEMBLY
15. OHMS ASSEMBLY
16. OUTER GUARD SCREEN
17. BOTTOM COVER ASSEMBLY
18. R.H. CENTRE GUARD SCREEN
19. FRONT PANEL AND OVERLAY
20. TERMINAL SUPPORT PLATE
21. FRONT PCB ASSEMBLY
22. FRONT GUARD SCREEN
23. L.H. PCB ASSEMBLY
24. L.H. CENTRE GUARD ASSEMBLY
25. CENTRE PCB ASSEMBLY
26. ANALOG ASSEMBLY
27. TOP COVER ASSEMBLY

FIG. 2.1 EXPLODED VIEW OF INSTRUMENT

SECTION 3

TECHNICAL DESCRIPTION

3.1 INTRODUCTION

The internal circuits of the instrument are built onto eight printed circuit board assemblies shown in Fig. 3.1.

Each of these assemblies will be described in turn by subdividing the circuit into separate blocks with a detailed explanation. This should assist servicing to component level.

3.2 DC ANALOG ASSEMBLY (Circuit Drawing No. 430421)

The DC Analog assembly is split into three distinct sections: (i) the Analog Interface, (ii) the DC Isolator and (iii) the Analog to Digital (A - D) Converter.

The Analog Interface receives data from the Digital assembly to control the selection of function, range and other features of the analog circuitry. Messages between the Analog and Digital assemblies are passed via opto-isolators, electrically isolating one from the other.

The DC Isolator includes the preamplifier, range scaling circuits and bootstrapped supplies. The A - D section converts the scaled input signal to a time period proportional to the signal using a modified triple slope technique.

3.2.1 Analog Interface (430421 sheet 5)

3.2.1.1 Introduction

The Analog Interface provides electrical isolation between the Digital and Analog circuitry. Latched data from the microprocessor is passed through opto-isolators, decoded and latched again on an analog assembly to select function, range, test, average and the D - A converter set up conditions.

3.2.1.2 Power-On

At power-on the A - D converter is placed into the RESET condition (See Section 3.2.3.8). The analog circuitry is placed into the DC, 1000V range until another range or function is selected (See Fig. 3.3).

In the description which follows (ID) is used to describe an Analog Interface Data line signal which drives the opto-isolators from the digital assembly. (IA) describes an Analog Interface Address line signal.

For both ID and IA:

logic '1' ≡ + 5 volts
logic '0' ≡ 0 volts

Firstly, all assemblies are deselected by placing logic '1's on all the ID lines, then setting the IAØ and IA1 lines low (see Fig. 3.4), clocking the function select latches (M20 Analog assembly, M5 AC assembly, M9 Ohms assembly, M1 Rear assembly from M17-3). Both IA lines then return high. Secondly, the latches of the D - A converter (M13, M14) are reset. The ID lines are set to logic '0' and clocked on to M13 and M14 by a delayed low to high edge from M17-4, originating from IAØ going low. The delay makes sure that the signal from M17-10 has disabled the "F.E.T." latch M21. Once again, the IAØ line returns to the resting state of logic '1'. Thirdly, the DC analog circuits are enabled by setting all the ID lines except for ID0, then clocking M20 by a low to high edge from M16-6 caused by both IA lines going low. Once DC has been selected, the F.E.T. pattern latch is enabled from M12-1, and the penultimate step is to load this latch with 1000V range data from the ID lines (ID4 low, the rest high). This is executed by clocking the 'F.E.T.' latch from M17-4 once again, but this time being due to IA1 going low. The final step is to reselect DC as described above.

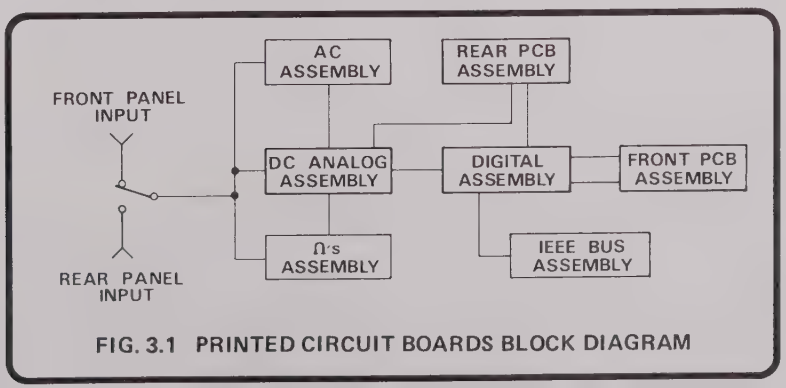


FIG. 3.1 PRINTED CIRCUIT BOARDS BLOCK DIAGRAM

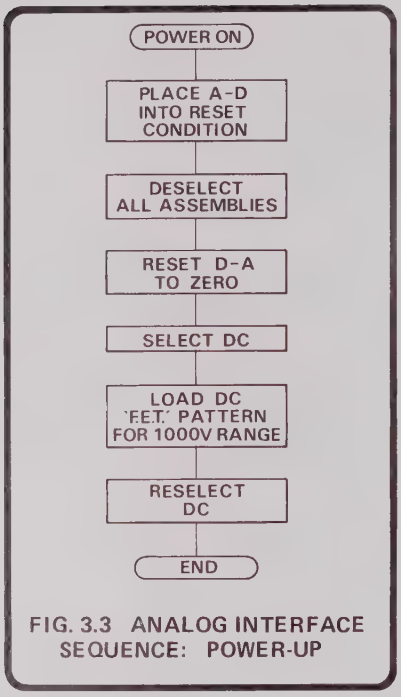


FIG. 3.3 ANALOG INTERFACE SEQUENCE: POWER-UP

3.2.1.3 General Interface Update Sequence

Before the start of each reading, the analog interface undergoes a complete update. The series of events is the same as the power-up sequence for selection of function and range, as can be seen by comparing the two flowcharts (Figs. 3.3 and 3.5). When Ohms is selected, the DC Isolator is also used in the measurement procedure as seen in the following table.

Type of Measurement	Circuits Selected	Use of D - A
DC Volts	Analog Assembly	Not used
AC Volts	AC Assembly	Frequency Compensation
AC + DC Volts	AC Assembly	Frequency Compensation
Resistance	Ohms Assembly and Analog Assembly	Not used

The update sequence order is (i) Deselect all assemblies, (ii) Load D - A latches, (iii) Select AC assembly or DC Isolator, (iv) Load range pattern into DC or AC range latches, (v) Deselect DC or AC and select the Ohms assembly, (vi) Load range pattern into Ω's latch, (vii) Reselect circuits selected in (iii) and (iv).

Note: Steps (v) and (vi) are used only when Ω's is selected.

Flowchart 3.5 gives the above sequence for an ohms update. The general form of the timing diagram for the above sequence is given in Fig. 3.6, the analog 'F.E.T.' patterns for each range of each function being given in Appendix 1.

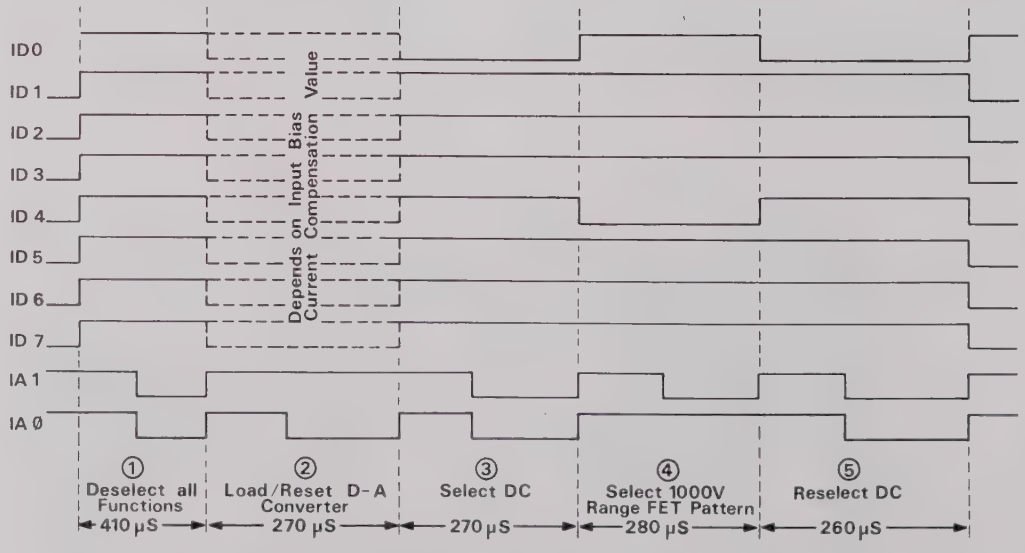


FIG. 3.4 ANALOG INTERFACE DATA LINE TIMING DIAGRAM (POWER-UP)

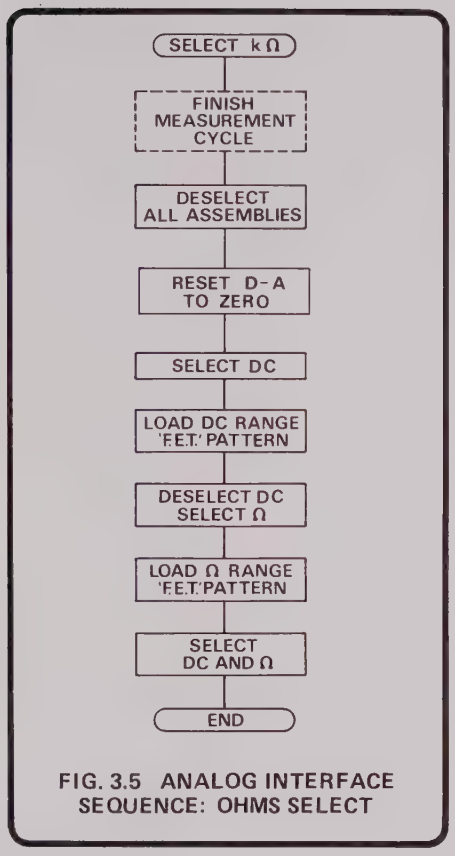


FIG. 3.5 ANALOG INTERFACE SEQUENCE: OHMS SELECT

3.2.1.4 Test

When TEST is selected, a logic '0' is placed on ID7 at stages (iii), (v) and (vii) in Fig. 3.6, i.e. each time a function measurement circuit is selected. Appendix I lists the 'F.E.T.' patterns of each assembly for each test measurement cycle.

3.2.2 DC Isolator Section

3.2.2.1 Preamplifier Scaling (430421 sheet 1)

Figure 3.8 shows the essential features of the isolator scaling circuit. For the purpose of explanation the same symbols are used, regardless of whether the switching is accomplished electronically (F.E.T.) or by means of relay contacts. In Fig. 3.8 all switches are shown in the 1V RANGE position.

The various switching combinations for the different ranges are as follows:—

Range	Gain	Q6	Q7	Q8	Q9	Q10	RL1
100mV	x31.6	ON	OFF	ON	OFF	OFF	ON
1V	x3.16	OFF	OFF	ON	OFF	ON	ON
10V	÷3.16	OFF	ON	OFF	ON	OFF	ON
100V	÷31.6	OFF	OFF	ON	OFF	ON	OFF
1000V	÷316	OFF	ON	OFF	ON	OFF	OFF
$\overline{DC}$		OFF	OFF	OFF	ON	OFF	OFF

The configuration of the circuit for each range is shown in Fig. 3.9.

Reference should be made to circuit diagram number 430421, sheet 1, for the complete circuit. Sheet 2 gives tables of the coding on the input control lines (from the Analog Interface).

When the 100V or 1kV range is selected, a ÷100, 10MΩ input attenuator (R143, R156, R149, R148) is incorporated into the circuit. This is a matched set of resistors for low temperature coefficient. The selection of a lower range energizes relay RL1 (via Q33), causing resistor chain R119-R122 to be in series with the Hi input. Should an overload signal then be applied, the resistor chain limits the current and the power dissipation is such that 1000V can be applied continuously.

The amplifier end of the resistors is clamped by zener diodes D22, D23 and Q18, Q19 to low, thus the amplifier input can never exceed approximately ± 24 volts.

The output from the DC Isolator, test point (TP13) is approximately 3.16 volts ($\approx\sqrt{10}$) for a full range (100,000) input by the following methods (See Fig. 3.9):—

100mV Range — Q6 and Q8 are turned on; all other F.E.T.'s are turned off and RL1 energised. Thus the output of the amplifier is connected to its inverting input via R108, R109, R110, R111 and Q6, an attenuator chain of ÷31.6, giving the amplifier an overall gain of X 31.6 Q8 connects the preamplifier directly to the output.

1V Range — Q10 and Q8 are turned on, all other F.E.T.'s are turned off and RL1 energised. The output of the amplifier is connected to its inverting input via R108, R109, R110, R111 and Q10, an attenuator chain of ÷3.16, giving the amplifier an overall gain of X 3.16. Q8 connects the preamplifier directly to the output.

10 V Range — Q9 and Q7 are turned on; all other F.E.T.'s are turned off and RL1 energised. Q9 causes the amplifier output to be directly connected to its inverting input, giving a gain of unity. The output of the amplifier is attenuated by 3.16 (R114, R115) before being passed to the output via Q7 instead of Q8.

100V and 1000V Ranges — These two ranges select the 1V and 10V ranges respectively but a ÷100 attenuator (R149, R156, R143, R148) is inserted between Hi and the preamplifier input when RL1 is de-energised.

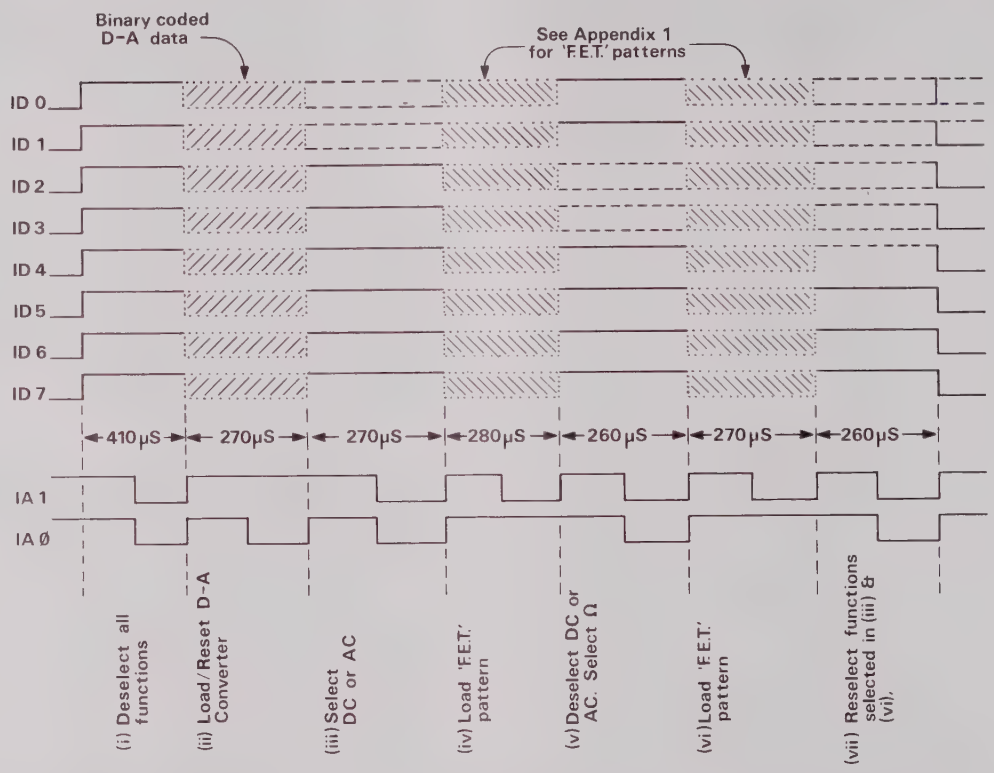


FIG. 3.6 GENERAL FORM OF ANALOG INTERFACE UPDATE TIMING DIAGRAM

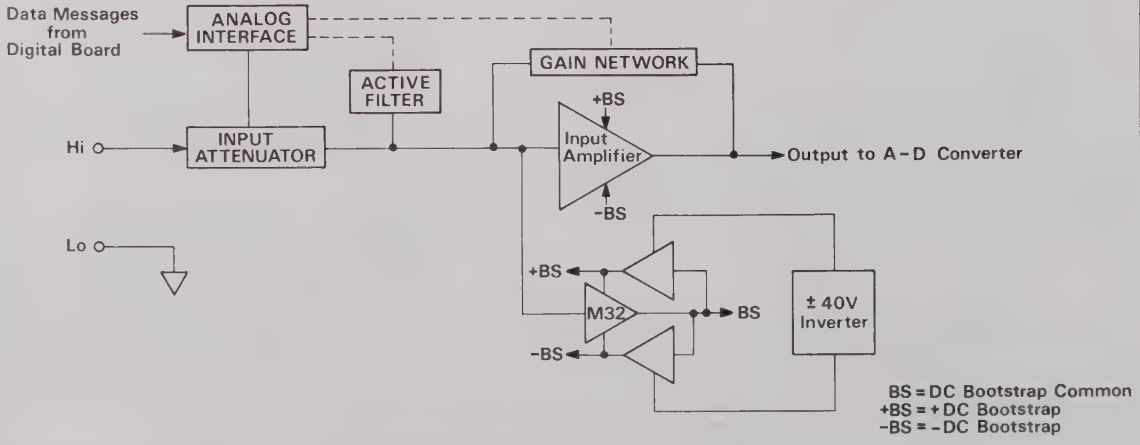


FIG. 3.7 SIMPLIFIED DIAGRAM OF DC ISOLATOR

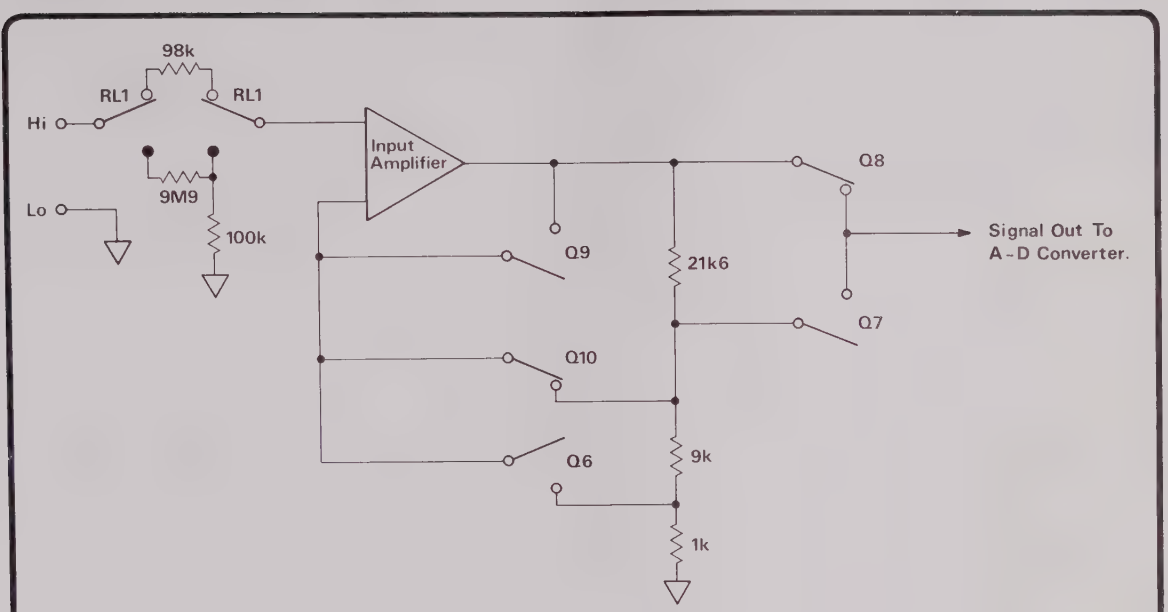


FIG. 3.8 SIMPLIFIED DIAGRAM OF ISOLATOR SWITCHING

3.2.2.2 Preamplifier (430421 sheet 1)

The preamplifier is designed to present an input impedance of greater than 10,000MΩ for signals up to ±20 volts. It is also bootstrapped (tracking of both ground lines and supply voltages with input signal) being essential for correct operation of input bias compensation, temperature compensation and common mode rejection.

Q12 is a well matched monolithic NPN transistor pair exhibiting minimal voltage drift and low noise characteristics, the output being buffered by M31. The input bias current is compensated as described in 3.2.2.5.

3.2.2.3 D.C. Bootstrap (430421 sheet 2)

Bootstrapped supplies are generated which track the input signal directly (BS), track the input signal with a positive offset of +12V(+BS) and track the input signal with a negative offset of −12(−BS).

M32 is the high impedance buffer which tracks the inverting input of the preamplifier. The offset of M32 is adjusted so that its input is within 100μV of the input of the preamplifier. M32 thus functions as the low impedance rail (BS) following the input signal.

Selection of DC(M20-3) enables the capacitive inverter driven from M33 to provide an unregulated +42V(TL4) and −42V(TL5) supply from the ±15V supply.

The positive bootstrap supply (+BS) is generated as a current source comprising Q26 and the shunt regulator, Q27, referenced to D50. When the output voltage of the regulator is approximately 1.2 volts above D50 cathode, Q27 conducts current into R175. Since the current in R175 is controlled to be constant by Q30, referenced to D50, the current flowing through R174 is reduced. Hence the supply current, "mirrored" in R173, is reduced and the output voltage controlled.

The negative bootstrap supply (−BS) is generated in a similar manner. Thus bootstrapped supplies of approximately ±12 volts are produced, tracking the input signal exactly.

3.2.2.4 Filtering (430421 sheet 1)

Selection of filter causes an active filter to be switched in by relay, R12, (via Q32). The filter gives an attenuation of −34 dB at 50Hz. The essential components of the filter are shown in Fig. 3.10.

3.2.2.5 Input Bias Current Compensation (430421 sheets 1 and 5)

To avoid taking current for the input bias of Q12 through the input attenuator and therefore from the source being measured, network R152, R153, R159 and R128 provides this current from the internal bootstrap supplies. R159 is adjusted to reduce the current in R144 to less than 10pA.

Since the gain of Q12 varies with temperature, without any further form of compensation, the bias current of Q12 will change and pass current through R144. To avoid this and maintain the input bias current of Q12 constant with temperature, the emitter current is made to vary with temperature using network R123, R126 and R135 in conjunction with the base-emitter temperature sensitivity of Q12, see Fig. 3.11.

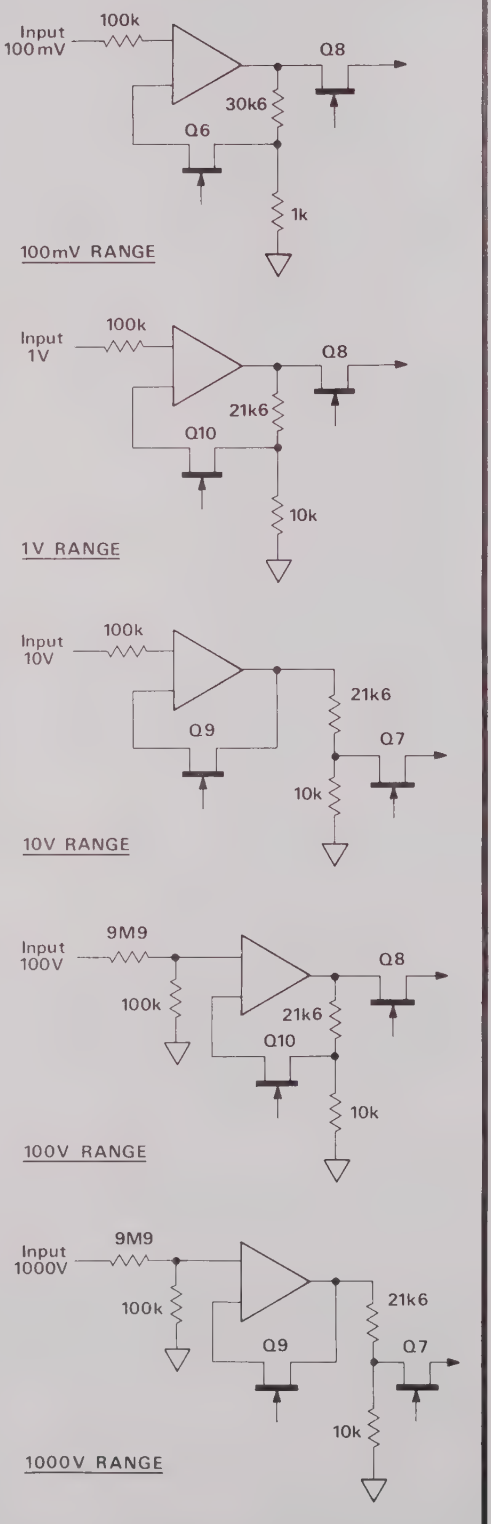


FIG. 3.9 PREAMPLIFIER GAIN CIRCUITS

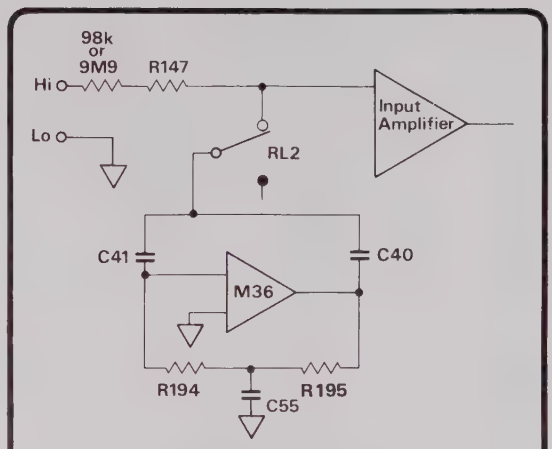


FIG. 3.10 SIMPLIFIED DC ISOLATOR FILTERING CIRCUIT

3.2.2.6 Test (430421 sheets 1 and 5)

During the self-test routine, (actuated from the front panel or remotely programmed) the DC isolator is checked for correct operation. The circuitry is placed into the 0.1V range, as described in 3.2.1.3, except that relay RL1 is not energized, (i.e. the ÷ 100 attenuator is across the input amplifier). Filter is selected and F.E.T. Q5 'closed' via M20-5 causing a small signal to be injected into the feedback path of the input amplifier. Thus a signal of −3.125 volts is output from the DC Isolator (TP13). This signal is then measured and compared with a stored value. If the measured signal is within ±6% of the stored value, the test continues with a 1V range check and a 10V range check.

Range	Output signal from DC Isolator (TP13)
0.1V	− 3.125 volts
1V	− 0.2193 volts
10V	− 0.06932 volts

DC Isolator Output Test Voltages

3.2.3 Analog to Digital Conversion (Analog Section) (430421 sheets 3 and 4)

3.2.3.1 General Principles

Section 1 and Fig. 1.2 of the User's Handbook gives a very basic description of the principles of the integration involved. The technique used in the Autocal Voltmeter is a quadruple slope, the two extra slopes being towards the end of the signal and reference integration periods respectively.

Fig. 3.12 is a simplified diagram showing the essentials of the analog section of the A - D conversion and should be used with timing diagram Fig. 3.13 for full appreciation of the circuit operation.

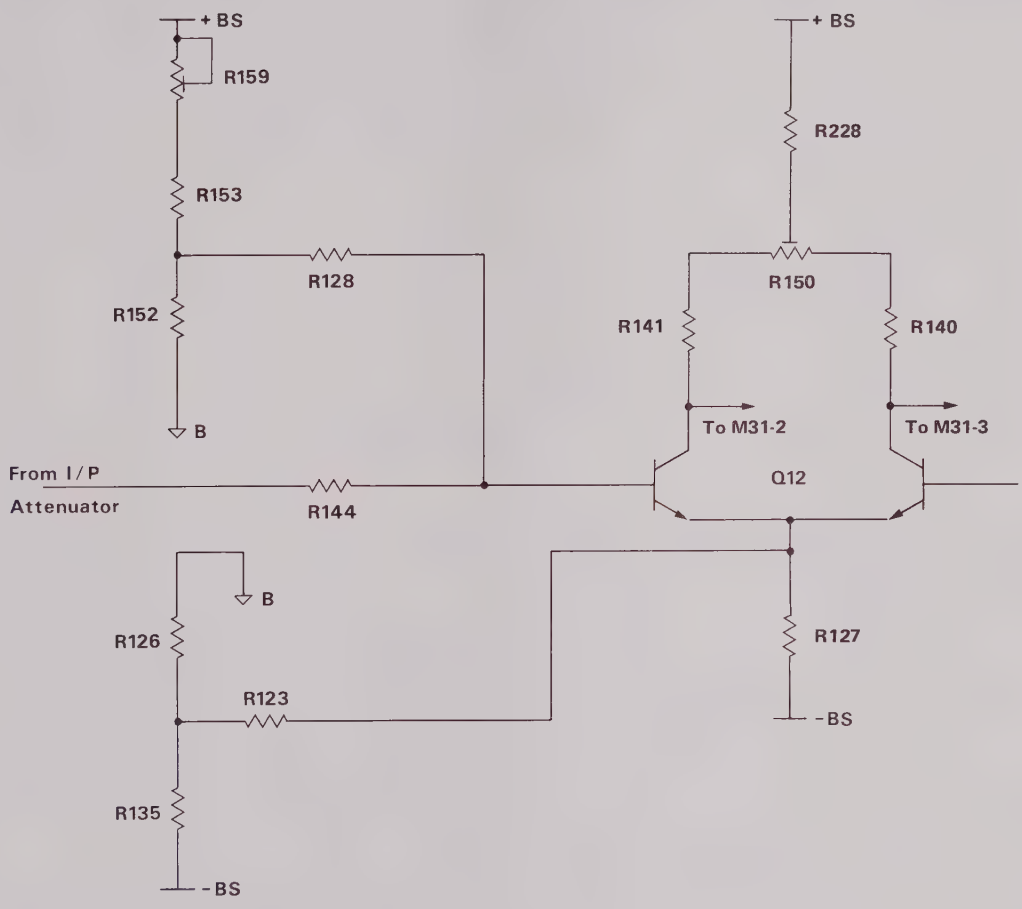


Fig. 3.11 PREAMPLIFIER INPUT BIAS CURRENT COMPENSATION

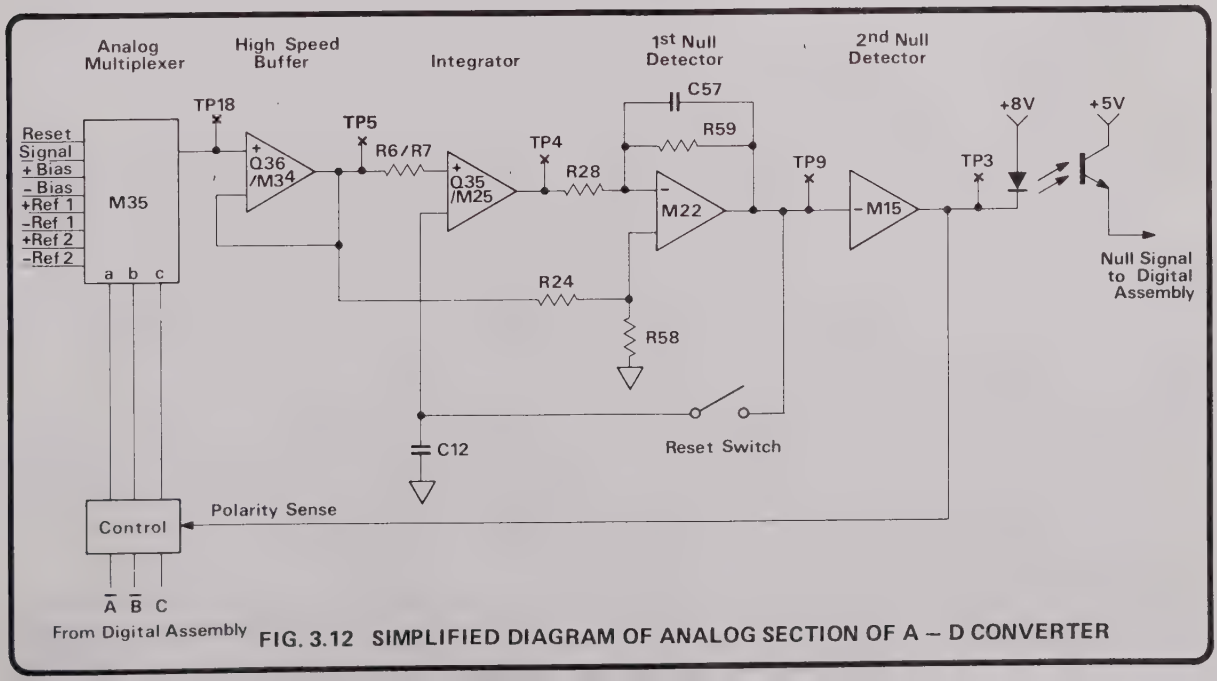


FIG. 3.12 SIMPLIFIED DIAGRAM OF ANALOG SECTION OF A – D CONVERTER

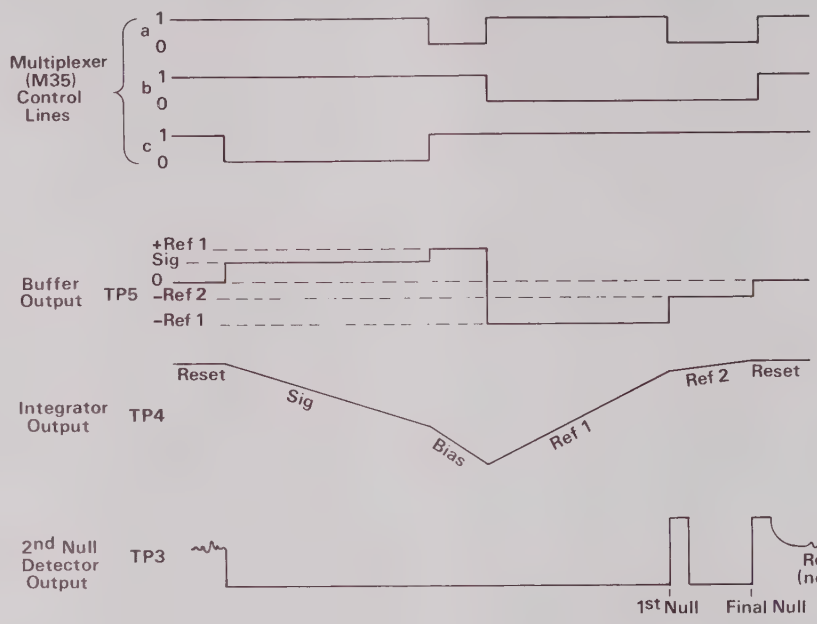


FIG. 3.13 TIMING DIAGRAM FOR ANALOG SECTION OF A – D CONVERTER (Positive Signal)

Timing is not to scale, Bias & Ref. 2 periods being very short compared with Sig & Ref.1

3.2.3.2 A - D Input Control

The analog signal from the DC Isolator is applied to the analog multiplexer (M35) and fed to the input of the buffer (Q36/M34). This in turn feeds the signal to the integrator comprising of Q35, M25 and C9.

Control of the multiplexer is derived from the Digital assembly via opto-isolators M4, M5 and M6. These signals control the sequence of events, allowing first the signal, then a bias voltage of the same polarity as the signal, followed by opposite polarity reference and reference ÷16 signals to the buffer and integrator. The multiplexer is then placed in a reset condition ready for the next measurement cycle. Fig. 3.14 gives the multiplexer control line sequence for both positive and negative signals.

STATE	a	b	c	STATE	a	b	c
RESET	1	1	1	RESET	1	1	1
SIG	1	1	0	SIG	1	1	0
+ BIAS	0	1	1	–BIAS	0	1	0
–REF 1	1	0	1	+REF 1	1	0	0
–REF 2	0	0	1	+REF 2	0	0	0
RESET	1	1	1	RESET	1	1	1
	Positive signal				Negative signal		

Logic levels : (0 ≡ –8V, 1 ≡ +8V)

Fig 3.14 MULTIPLEXER CONTROL LINE SIGNALS

3.2.3.3 Reference Voltages and Control Logic Power Supply

REF 1 : The two halves of M39 in conjunction with zener diodes D60 and D59 form the positive and negative reference voltages respectively, D65 and D64 being 'start-up' diodes (see Fig. 3.15). The outputs of M39 (+11 and –11 volts) supply the defined current for the reference zeners via R212 and R38 respectively. R19 and R18 are selected by Datron so that each zener has very low voltage temperature coefficient.

The resistor chains R41-R43 and R88-R90 are binary weighted values allowing the set up of the exact nominal REF 1 voltages, of ±6.42V, by cutting the appropriate links.

REF 2 : The second reference is 1/16th of REF 1. The positive and negative REF 1 voltages are divided by R71, R68 and R214, R70 respectively.

The power supplies for the logic circuits M35, M29, M27, M28 and opto-isolators M1, M4, M5 and M6 are also derived from M39 via zener diodes D61 and D62, giving supply voltages of ±8 volts.

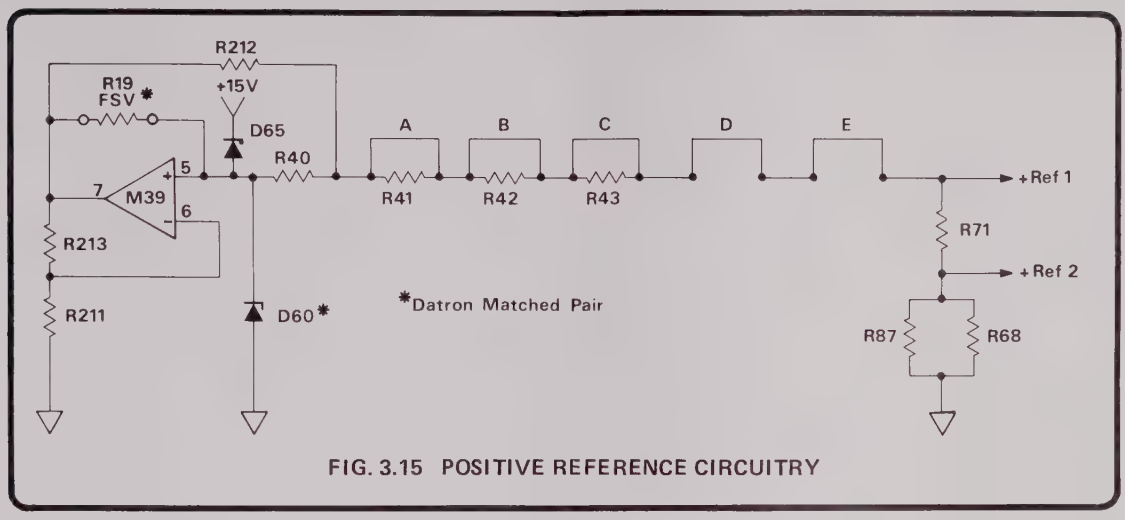


FIG. 3.15 POSITIVE REFERENCE CIRCUITRY

3.2.3.4 High Speed Buffer

C22 slows the switching edges from the multiplexer M35 so that the buffer cannot slew-limit and thus lose the charge. The signals are fed to Q36, M34 which comprise a high speed buffer with high common mode rejection ratio (See Fig. 3.16). The common mode rejection is dependent on the power supplies of Q36 (from R66 and R11-R15) being bootstrapped to the output of the buffer, via D2 and D4. Thus the difference between input signal and power supply around the input stage is maintained constant whatever the input signal.

Q2 and Q3 boosts the gain of Q36 by allowing the drains to see a high load resistance.

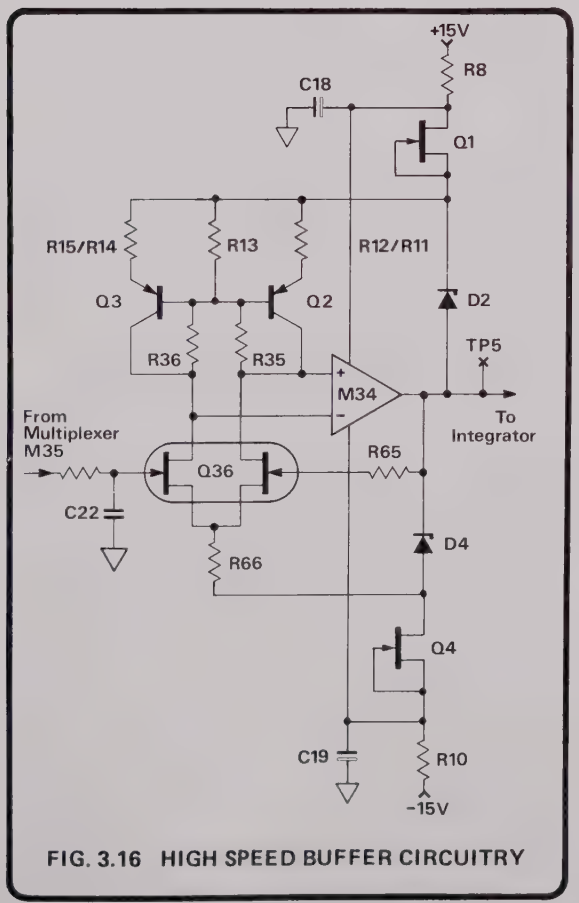


FIG. 3.16 HIGH SPEED BUFFER CIRCUITRY

3.2.3.5 Integrator

The Integrator basically comprises an amplifier made up from Q35 and M25 with a charge storing capacitor C9 (See Fig. 3.17). The low gate leakage F.E.T. pair, Q35, boosts the gain of the integrator such that it is great enough to guarantee no non-linearity errors due to finite gain.

R4, C10 driven by an attenuated and inverted version of the integrator-output waveform, via R26 and R5, form a circuit to compensate for the small amount of dielectric absorption present in C9.

C11, R23 and R27 provide similar compensation but in this case the time constant is such that it effects the linearity, with R23 set to correct linearity at 1/10th of full range.

3.2.3.6 1st Null Detector

The 1st null detector comprises a low noise amplifier, M22, an inverting configuration, where the dc gain is controlled by the ratio of R59 to R28 for small inputs. For larger inputs from the integrator the clamp diodes, D1 and D3, prevent the amplifier from saturating.

During REF 1 the non-inverting input is offset by approximately 10mV to determine the point at which REF 2 is applied (after counting is synchronised). In REF 2 the offset reduces by a factor of 16 giving the null reference point.

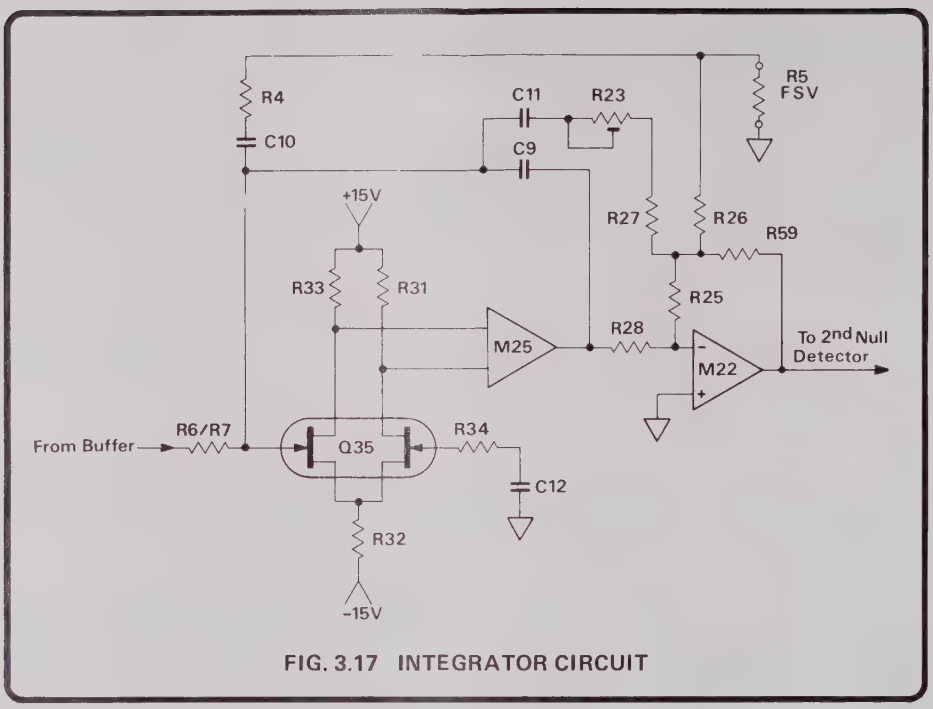


FIG. 3.17 INTEGRATOR CIRCUIT

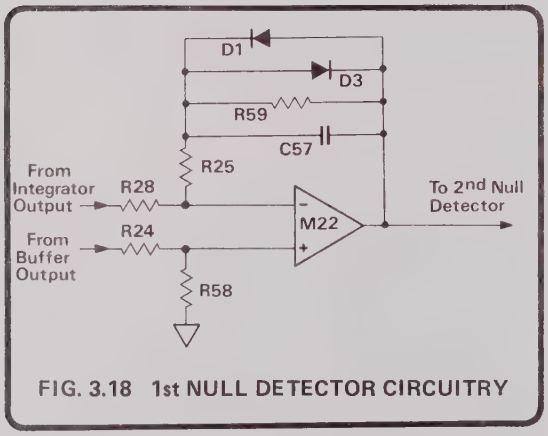


FIG. 3.18 1st NULL DETECTOR CIRCUITRY

3.2.3.7 2nd Null Detector

The signal from the 1st null detector is applied to M15 which boosts the voltage gain. The output provides a logic drive signal via opto-isolator M1, signalling the digital circuitry whenever a null condition changes, Fig. 3.19.

When 'Zero' is selected or the instrument is in the 'Cal' mode, an averaging process is performed over a series of 16 readings to provide greater resolution. (See Fig.3.20). This is achieved by sequentially introducing a small offset into the second null detector from the digital to analog converter, M28, which is clocked by M6 and enabled by the level shifted $\overline{AVE}$ signal.

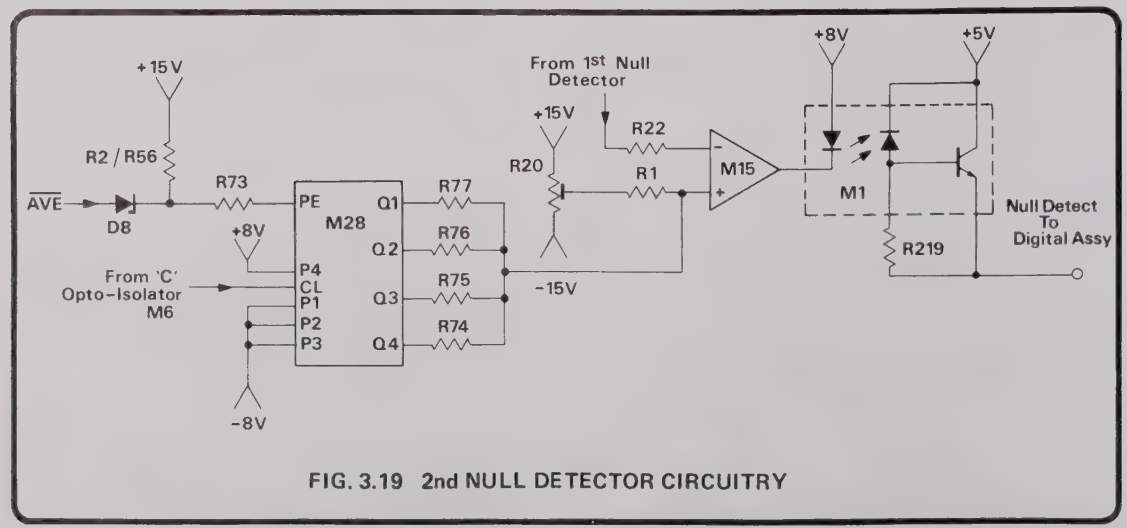


FIG. 3.19 2nd NULL DETECTOR CIRCUITRY

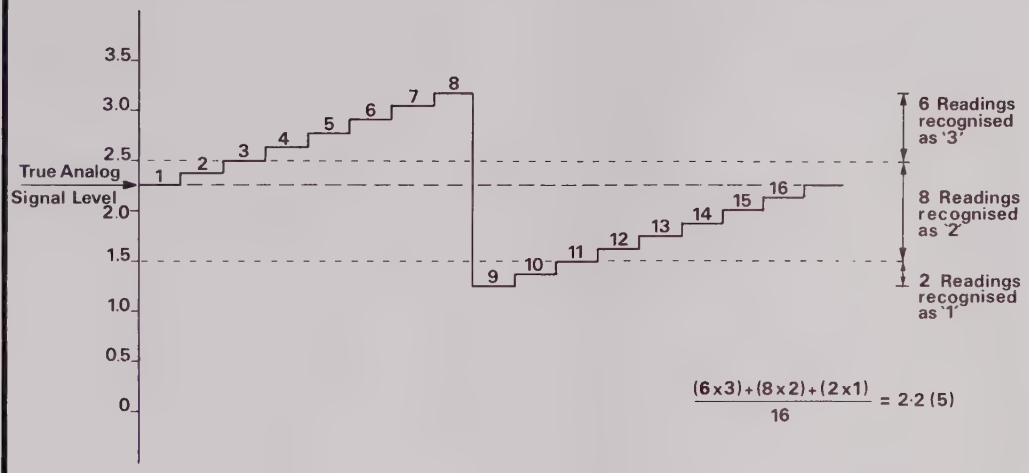


FIG. 3.20 DIAGRAM OF AVERAGING PROCESS

3.2.3.8 Reset Period

At the end of a measurement cycle or when 'Reset' is selected on the front panel, the circuitry is placed into a reset condition. The control lines of the multiplexer M35 allows the 0 volts reference input, at pin 4, to be connected to its output. (See Fig. 3.21). At the same time the reset line (M27-3) is taken high, turning on M26. This reset signal, applied to pins 5 and 12 of M26, allows the output of the 1st null detector to be fed back via R60 to a sample and hold capacitor C12 on the integrator.

Thus, with the input to the A - D converter at zero volts, the charge stored on C12 is the sum of all the offsets from the multiplexer, buffer, integrator and 1st null detector, allowing the 1st null detector to indicate the true zero crossing (null) point.

The reset signal applied to M26 pins 6 and 13 merely allows a lower impedance path between the buffer and the integrator to speed up the settling time as C9 is discharged to zero.

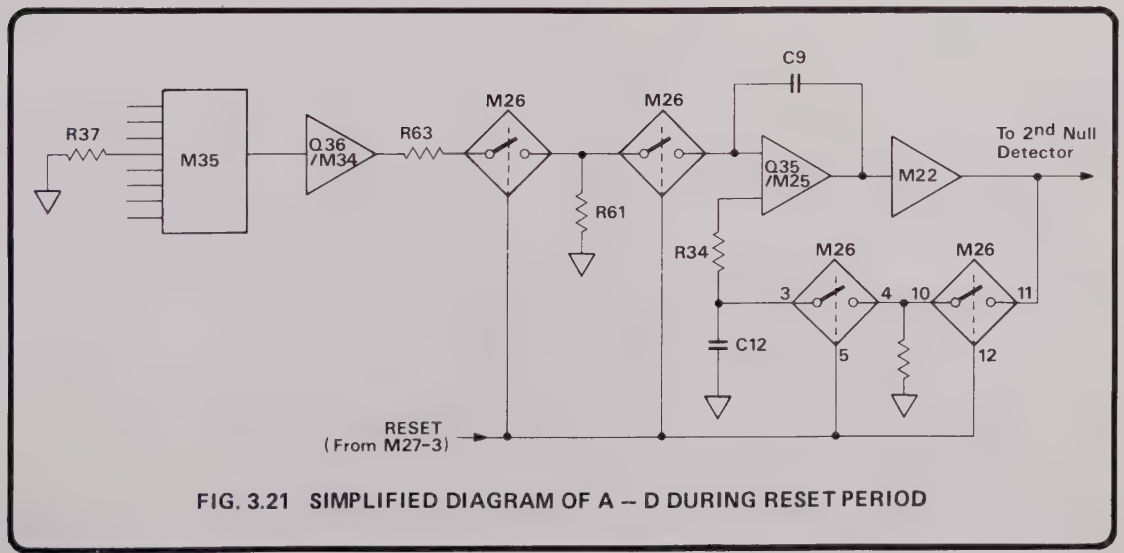


FIG. 3.21 SIMPLIFIED DIAGRAM OF A – D DURING RESET PERIOD

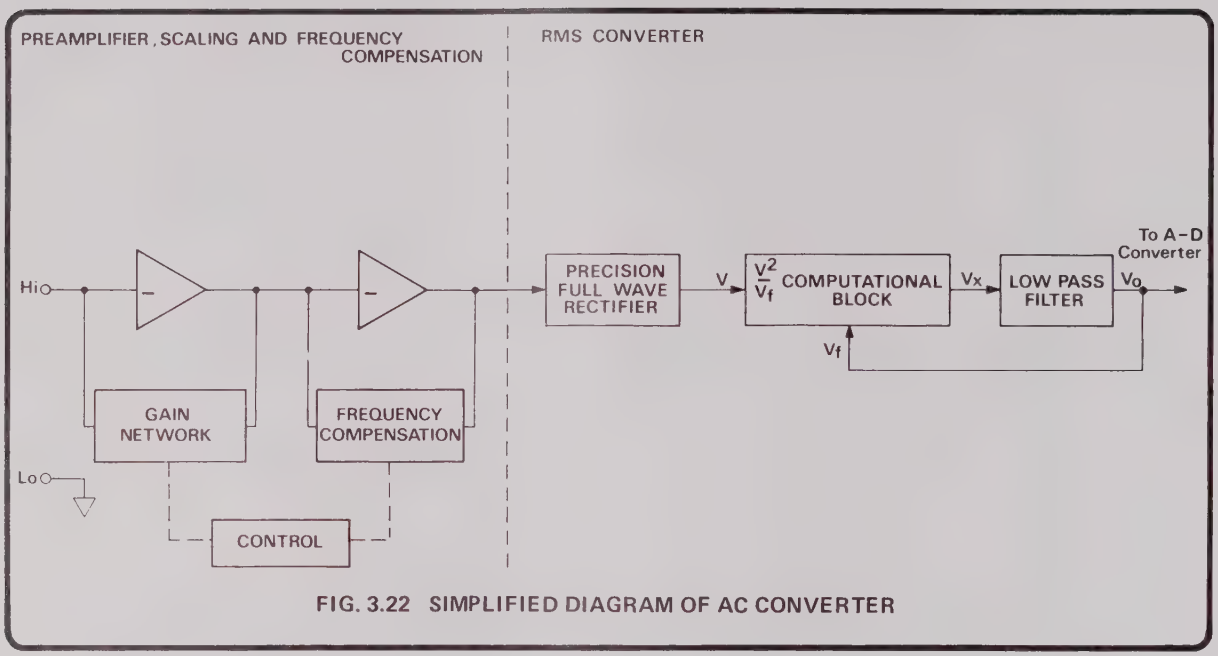


FIG. 3.22 SIMPLIFIED DIAGRAM OF AC CONVERTER

3.3 AC ASSEMBLY (Circuit Drawing No. 430425)

3.3.1 General Principles

The preamplifier buffers and ranges the signal in order to present 0.9 volts full range to the RMS converter section.

Once converted to an equivalent DC signal, it is applied to the analog to digital converter on the main analog assembly.

The conversion technique is electronic true RMS sensing as shown in the simplified block diagram Fig. 3.22. The Datron RMS module can be best considered as a functional block consisting of circuitry which accepts two inputs, V and V_f, computes V^2/V_f and has an output of V_x which is then filtered so that all the AC components are removed. The output of the block is fed back to V_f, thus closing the loop around the whole circuitry.

Mathematically: $\overline{V_x} = V_o$

but $V_x = V^2/V_f$

$\overline{V^2}/V_f = V_o$, but $V_o = V_f$

$\overline{V^2} = V_o^2$

i.e. $\underline{V_o = \sqrt{\overline{V^2}}}$

3.3.2 Preamplifier and Scaling (430425 sheet 1)

Relay RL2 is energised on selection of AC, directly connecting the Hi terminal to the input of the AC assembly. If DC and AC are selected together, the AC assembly becomes DC coupled by energising RL3, causing C57, the AC coupling capacitor, to be by-passed.

The signal is then fed to the switched gain inverting preamplifier whose full range output is 0.9 volts r.m.s. A simplified diagram of this arrangement is shown in Fig. 3.23. The frequency response is held flat, to within ±1%, by controlling the gain defining component time constants, to a similar order of accuracy. Residual errors are removed by the frequency compensation stage. (See section 3.3.4).

The preamplifier has a stable DC path provided by a dual transistor pair Q33 and a fast AC path by dual F.E.T.'s Q32 and Q34. Further gain is provided by the following long-tail pair cascade of Q20, Q21, Q22 and Q23, which is loaded by a current mirror, Q24. Q15 and Q16 with bias components Q17 and Q18 form a conventional class AB output stage. R121 compensates for the bias current of Q33, whileR112 trims the offset voltage to zero.

The unity gain frequency compensation amplifier consists of M11. The bootstrap circuit of Q19 presents the varicap diode, D11, with a high impedance, thus ensuring that the varicap is not shunted to ground.

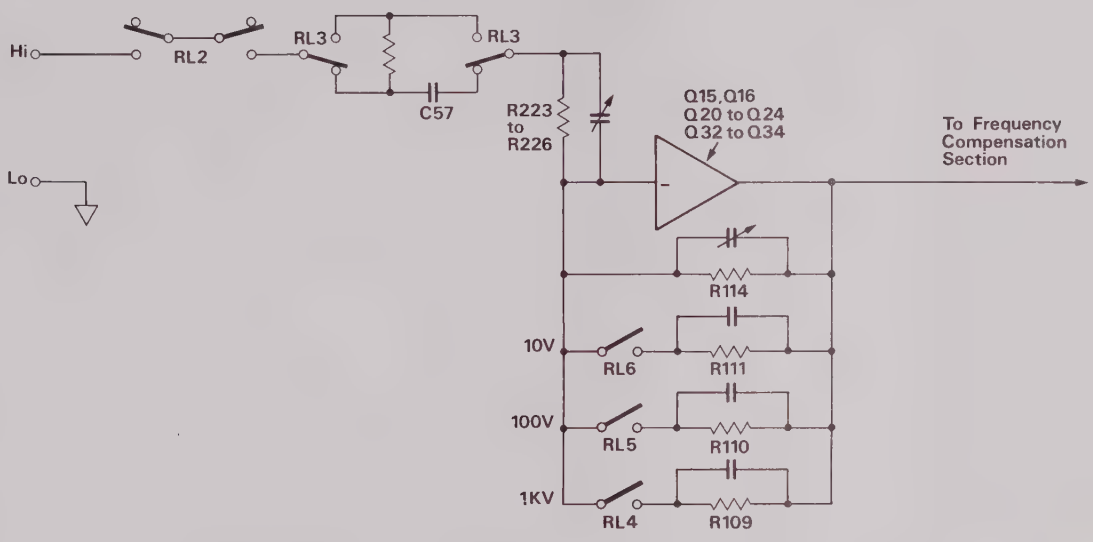


FIG. 3.23 SIMPLIFIED DIAGRAM OF THE AC PREAMPLIFIER SCALING

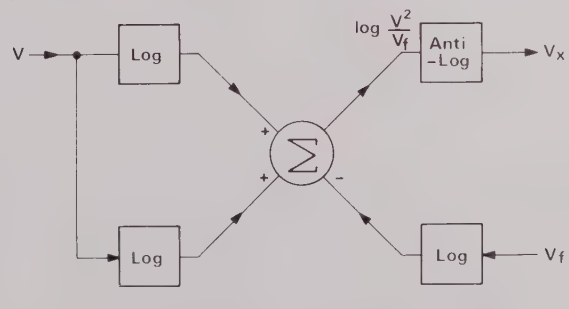


FIG. 3.25 BLOCK DIAGRAM OF RMS
CONVERSION TECHNIQUE

3.3.3 RMS Converter (430425 sheet 2)

The RMS converter takes the scaled AC signal from the preamplifier and converts it to an equivalent DC signal suitable for Analog-to-Digital conversion. The conversion technique is electronic true RMS sensing as shown in the simplified block diagram Fig. 3.25.

M8 and M9 form a summing type, full wave rectifier. The output of M8, a precision half-wave rectifier inverter, is summed with the non-inverted signal with a weighting of 2 : 1 at the input of M9. This forces a full-wave rectified current to flow in RMS module M6. Potentiometer R50 balances the rectifier to provide the same output for non-inverted or inverted asymmetric waveforms.

The output current from the RMS module passes into filter-buffer M1 and is converted to a nominal 5 volt for a full range signal. Q1 and Q2 switch in additional capacitors when FILTER is selected, to operate down to 45Hz. M2 is a voltage to current converter providing a feedback current to the RMS module proportional to the output voltage. R90 is the zero adjustment for the half wave rectifier M8 and R35 is the high crest factor gain adjustment. R75 is adjusted for optimum linearity.

The output of M1 (TP2) is fed to a resistor chain R1 - R7, to provide an output of 3.14 volts by the selection of resistors R2 - R5. Q3 is turned on when AC is selected and switches the output of the AC converter into the Analog-to-Digital Converter (Drawing No. 430425 sheets 3 and 4).

3.3.4 High Frequency Compensation

During the calibration cycle, the microprocessor notes and stores the high frequency (HF) error of each range. When AC volts is selected the compensation information for a particular range is recalled by the microprocessor, transferred across the isolation barrier and latched on to M13, M14 (Drawing No. 430425 sheet 5), see Fig. 3.26. The output from the latches is applied to a digital-to-analog converter via connector J1 pin 11 and applied to varicap D11. The varicap is thus adjusted to give the amplifier chain a flat frequency response.

The calibration is carried out at one H.F. frequency but since it flattens the AC amplifier response, the correction is valid for all specified frequencies. It should be noted that the calibration routine is iterative since the varicap is non-linear.

3.3.6 Test

During the self-test routine (actuated from the front panel or remotely programmed) the AC assembly is checked for correct operation. The circuitry is placed into the 1V range as described in Section 3.2.1.3. Filter is selected and F.E.T. Q31 is 'closed' from M5 - 13 causing a signal of 0.08 volts DC to be injected into the preamplifier. Thus a signal of approximately 0.314 volts is output from the RMS section and applied to the A - D converter situated on the Analog assembly. This signal is then measured and compared to within ±6% of the stored value.

Range	Output from RMS section
1	+0.314 volts

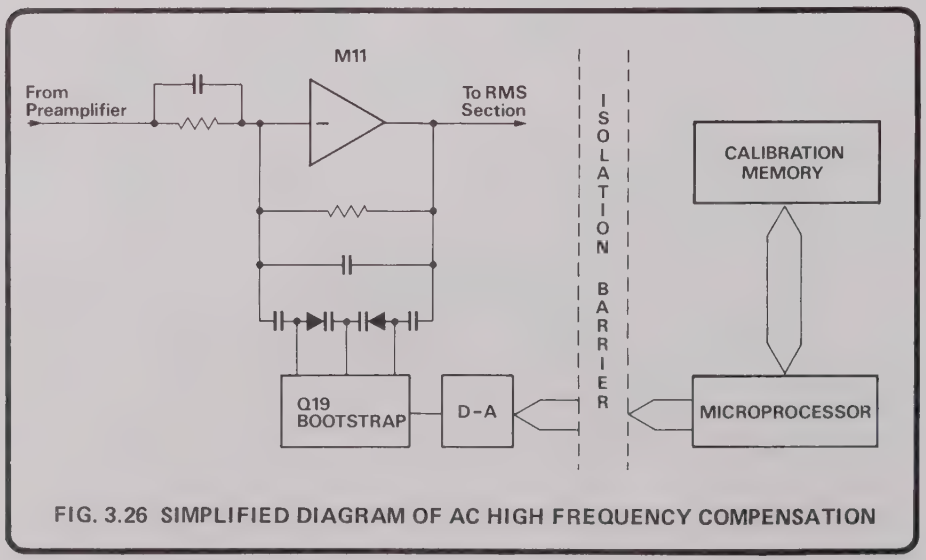


FIG. 3.26 SIMPLIFIED DIAGRAM OF AC HIGH FREQUENCY COMPENSATION

3.4 OHMS ASSEMBLY (Circuit Drawing No. 430426)

The instrument functions by measuring the voltage across an unknown resistance with a known constant current flowing in it. The converter can be split into two parts a low drift voltage follower and a constant current source covering 5 decades from 100nA to 1mA (see Fig. 3.27).

It should be noted that when the Ohms function is selected the DC Isolator Lo is no longer directly connected to the front/rear panel Lo terminal, but goes via RL1 on the Ohms assembly. Lo becomes an active terminal in resistance measurements.

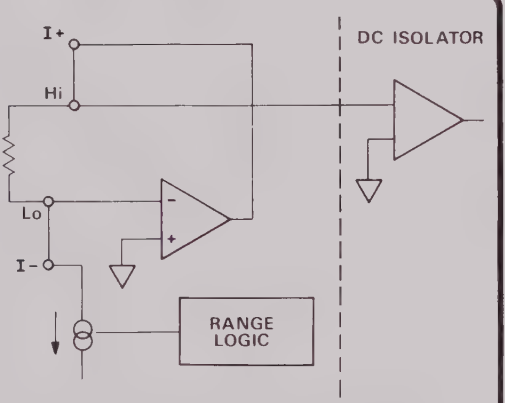


FIG. 3.27 SIMPLIFIED RESISTANCE CONVERTER

3.4.1 Low Drift Voltage Follower

When OHMS is selected, the front panel Lo terminal is connected to the –ve input of amplifier Q10/M3, the +ve input being referred to DC isolator Lo (this remains reference common). Q10/M3 will thus apply a voltage at the I+ terminal via RL1 such that the voltage at front panel Lo is at reference common plus any offset due to Q10/M3. This voltage offset drift is kept small for changes of temperature by compensating the input bias current of Q10 with the current in R67, which changes with temperature due to the voltage drift at Q10 emitters. Q10 input bias current is initially nulled by R26.

Thus if we consider 2-wire measurement, I+ is linked to Hi, I– is linked to Lo and the unknown resistance linked between Hi and Lo, with a constant current flowing from I+/Hi, through the unknown resistance (R_X) to Lo/I–. The Lo terminal is maintained at 0V. Therefore the Hi terminal (DC Isolator Input) is at $I_{constant} \times R_X$ volts above Lo. As long as the error is small referred to reference 0, the DVM will read the correct resistance.

Input protection is provided as follows:–

Voltage/Current applied to input terminals:

I+	R9, D10
I–	R2, D2, R23
Lo	R12, R13, Q8, Q9

Open circuit voltage limit protection:

I+	D10
I–	D2

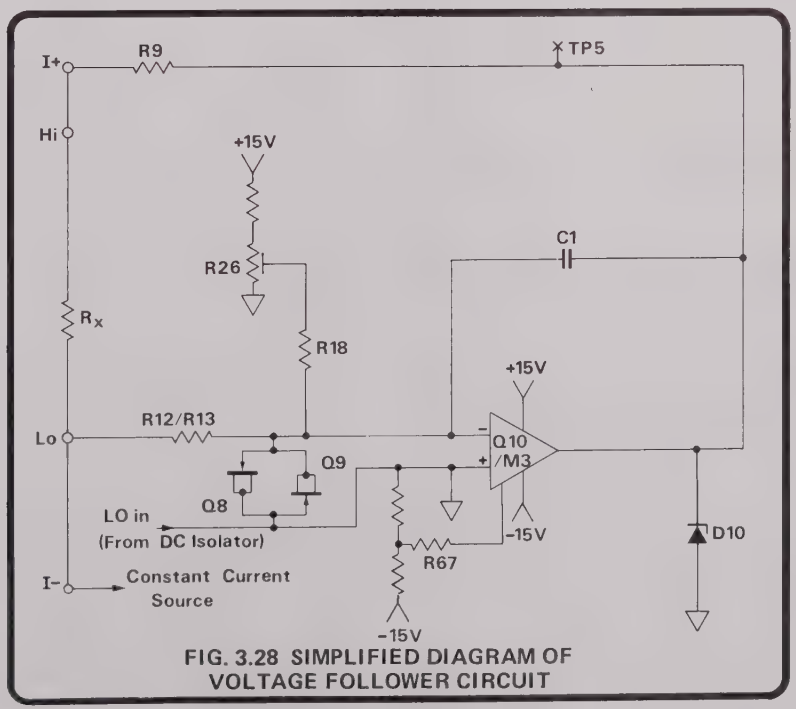


FIG. 3.28 SIMPLIFIED DIAGRAM OF VOLTAGE FOLLOWER CIRCUIT

3.4.2 Constant Current Source

Six decades of ohms ranges are provided by 5 ranges of current and 2 ranges of DC Isolator voltage gain (100mV range for 100Ω, 1V range otherwise). See Fig. 3.29.

Range	Current	F.E.T.'s/Switches turned on	
		Current Selector	Leakage path
100Ω	1mA	M1(A)	
1kΩ	1mA	M1(A)	
10kΩ	100μA	M1(B)	
100kΩ	10μA	M2(A)	M2(B)
1MΩ	1μA	M1(D)	M2(B), M2(C)
10MΩ	100nA	M1(C)	M2(B), M2(C)

FIG. 3.29 OHMS CURRENT RANGE SWITCHING

When kΩ's is selected, Q17 (430426 sheet 2) is turned on enabling astable M6 to produce a 200Hz signal to switch M5. Thus when gates B and C of M5 are open, C9 is charged up from the negative reference (originating from the analog section of the A - D converter). These gates then close and A and B open, sharing the charge with C8, the voltage across C8 equals the reference voltage (sheet 1). The voltage developed across C8 causes M4 to sink current through resistor chain R24, R25, R29, until the voltage developed across the chain balances that across C8. Thus the current required for a particular range is selected by the value of the resistor chain switched by M1 and M2. Simplified diagram Fig. 3.30 shows the resistor chain and switching for each range. On the high resistance ranges leakage paths are provided by M2(B) and M2(C).

To produce good common mode rejection, the negative supply of M4 is bootstrapped. The filtered bootstrap supply (−ΩBS) powers the astable (M6) and bilateral switch.

The use of ohms guard permits in-circuit measurement of resistors, provided shunt paths are greater than 500Ω and a suitable tapping point is available. Consider Fig. 3.31. Guard is reference 0, Lo is actively maintained within microvolts of reference 0 (as previously explained). Thus there is no voltage across Rz and consequently no current in Rz. Voltage follower Q10/M3 will simply pass more current into Ry from the I+ terminal until the selected current for the particular range flows through Rx.

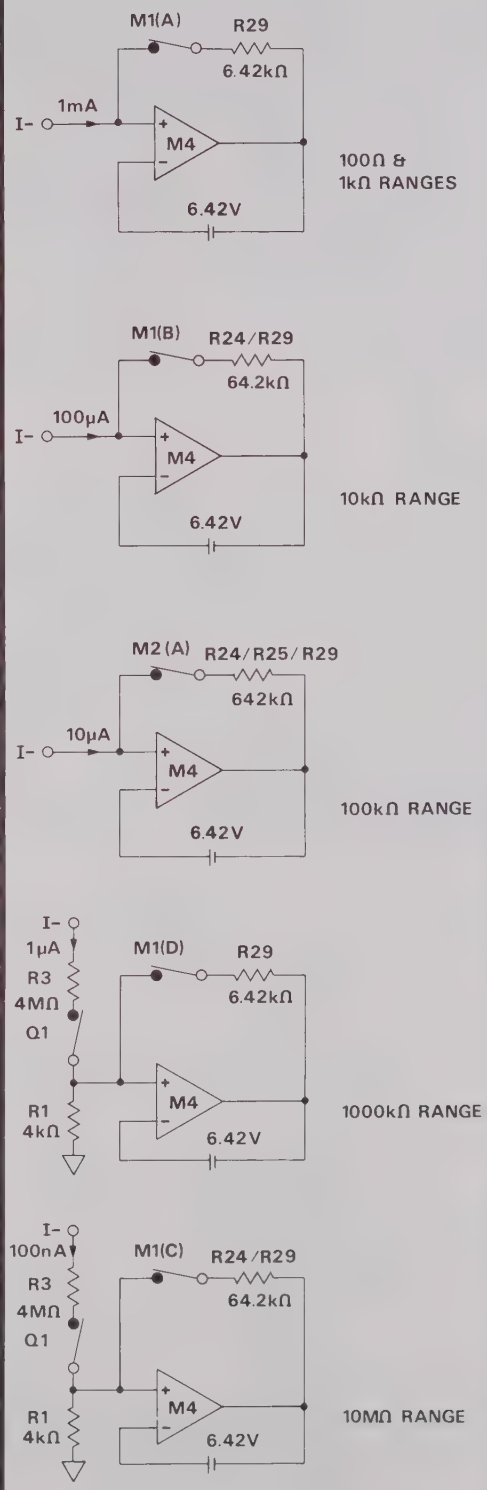


FIG. 3.30 SIMPLIFIED Ω CURRENT SWITCHING

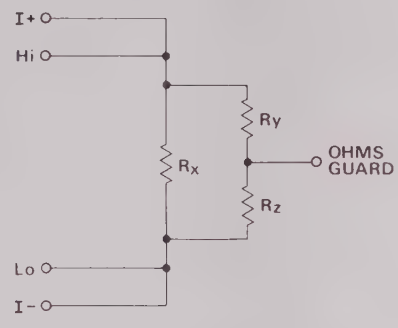


FIG. 3.31 USE OF OHMS GUARD

3.4.3 Test

During the self-test routine (actuated from the front panel or remotely programmed), the Ohms Converter is checked for correct operation. The circuitry is placed into the 10kΩ range as described in Section 3.2.1.3. Filter is selected and F.E.T. Q5 'closed' from M9-1 causing R8 (9.76kΩ) to be placed between I+ and I−. Thus with I+ and Hi, I− and Lo connected (2-wire if front panel input selected), the DC Isolator (which is also in the TEST mode) measures the voltage developed across the resistor (approx 1 volt). The resulting voltage output from the DC Isolator is applied to the A-D converter, measured and compared to the stored value. If the measured signal is within ± 6% of the stored value, the test is complete.

3.8 DIGITAL ASSEMBLY (Circuit Drawing No. 430422)

The Digital assembly contains the circuitry providing the general management of the instrument and the digital section of the A-D converter. Fig. 3.33 outlines the main portions and signal highways of this board.

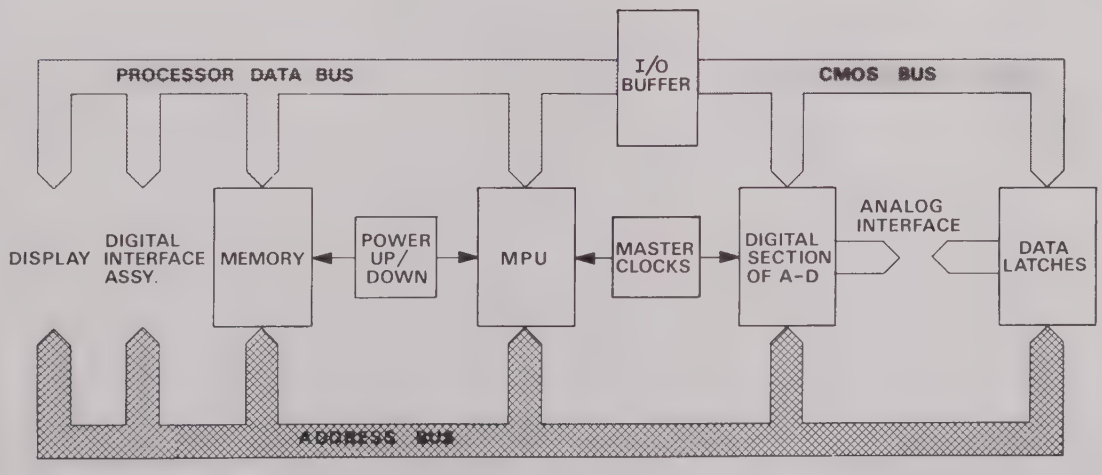


FIG. 3.33 SIMPLIFIED BLOCK DIAGRAM OF DIGITAL ASSEMBLY

3.8.1 Processor and Memory (430422 sheet 1)

A 6800 microprocessor (MPU) together with 8k bytes of memory controls the communication between the front panel, digital interface, display drivers, Digital and analog assemblies. The memory can be split into five main areas:—

(1) Program Memory - needed to operate the whole instrument system.

(2) Constant Data Memory - e.g. Self Test limits, Error read-out specifications and other fixed factors.

(3) Non-volatile Calibration Memory - used to store all the calibration errors used for each reading and determined during the 'Auto-cal' cycle.

(4) Operating Memory - used for scratch pad operations and storing.

(5) Volatile Display Memory - volatile data such as Max-Min stores, Limit stores and computation stores.

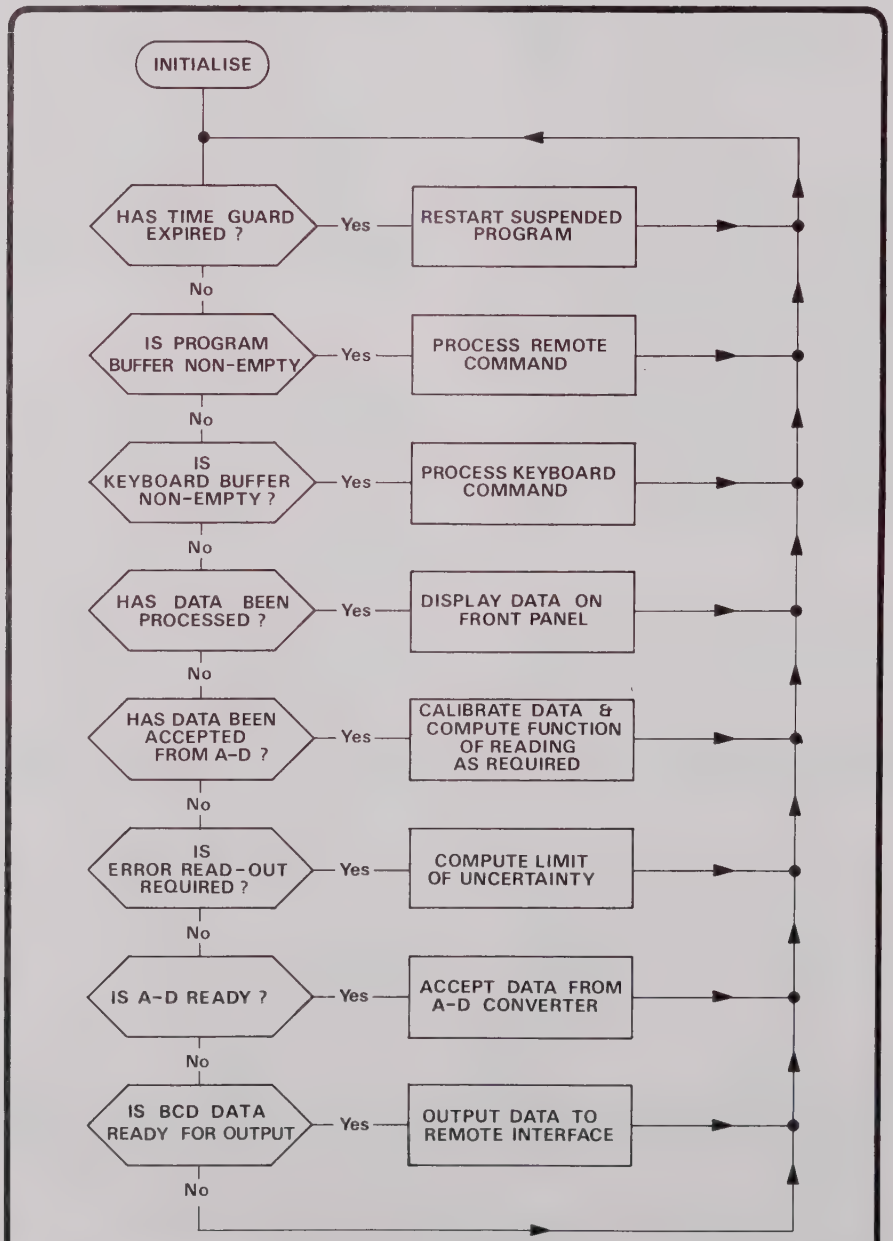


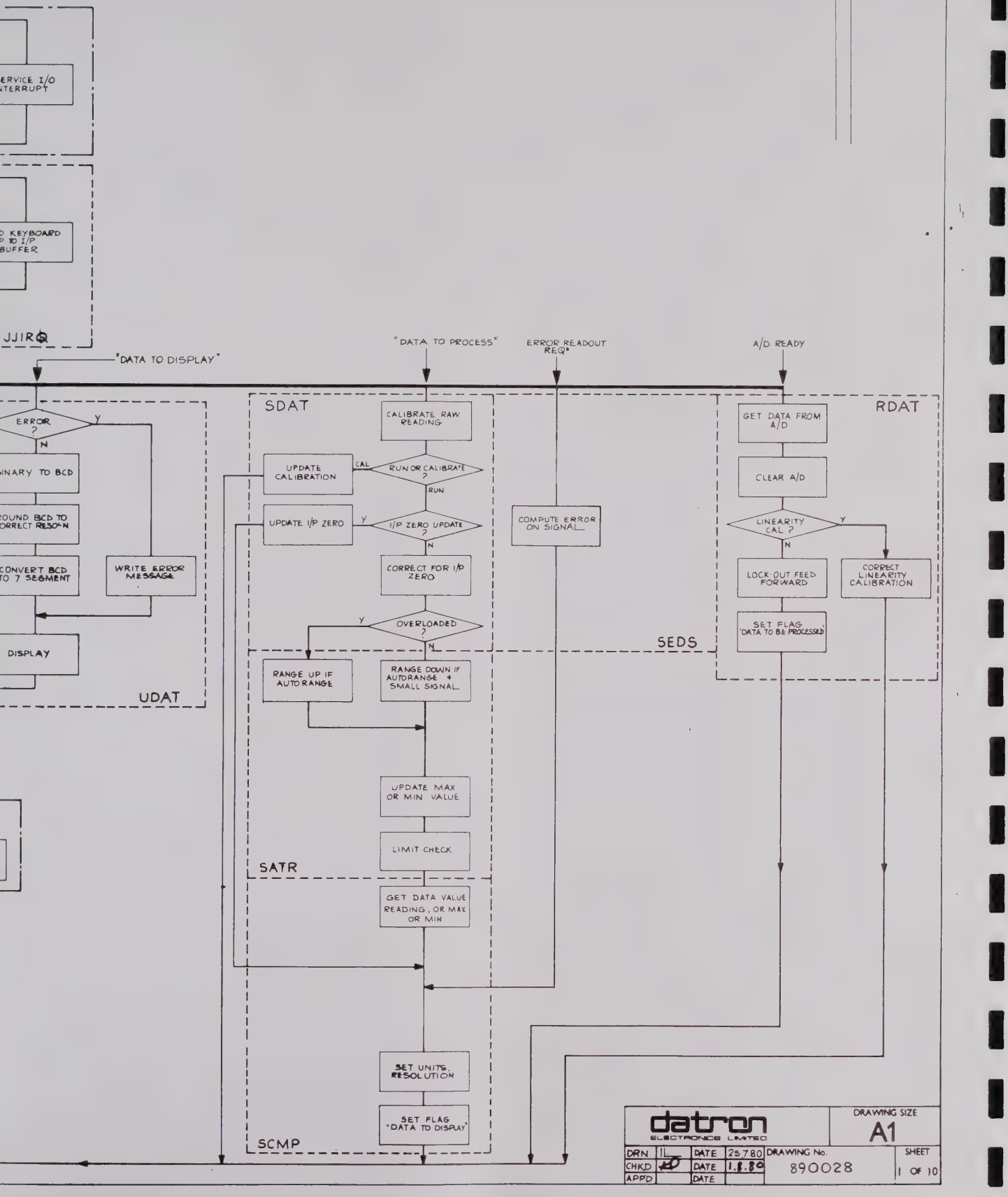
FIG. 3.34 JOB SCHEDULER

ALL BURRS TO BE REMOVED

NOTES

' Y DENOTES YES N DENOTES NO

ISS	CHANGES
A	25 7 80
	RELEASED 1.8 80

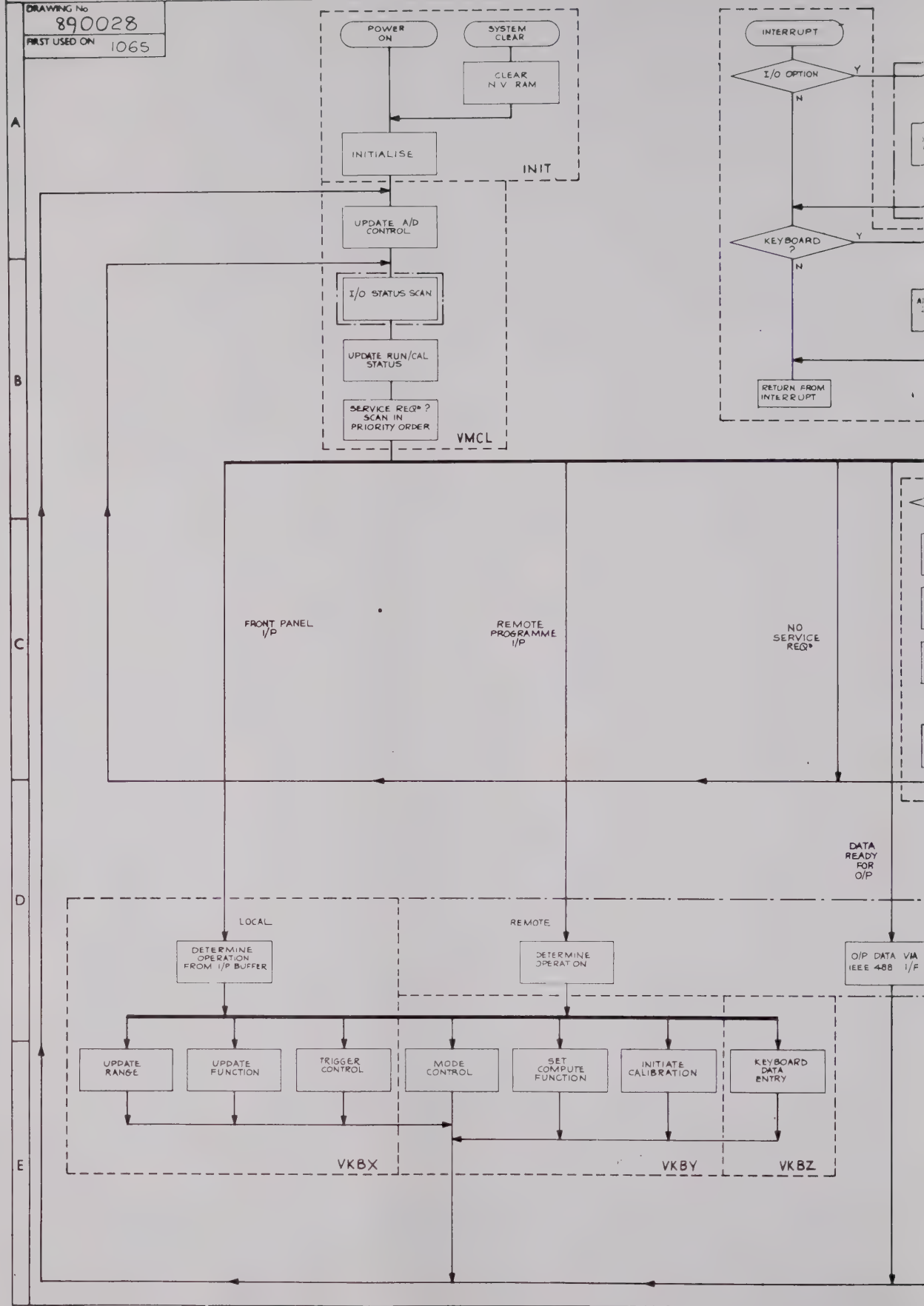


datron ELECTRONICS LIMITED

DRAWING SIZE A1

DRN	IL	DATE	25 7 80	DRAWING No. 890028	SHEET 1 OF 10
CHKD		DATE	1.8.80		
APP'D		DATE			

DRAWING No 890028
FIRST USED ON 1065



3.8.1.1 Software Overview

The system uses the technique of a looping prioritised job scheduler (see Fig. 3.34). Each job driven from the scheduler is controlled by a flag in the system workspace which is set when the job is required to be run and cleared when completed. Priority of activation is ensured by making each job exit on completion, to the top of the scheduler.

Program Modules: The program memory is split into a series of functional modules, each module corresponding fairly closely to a major functional area and hence to one of the jobs activated by the job scheduler, the larger jobs being sub-divided, see Drawing No. 890028.

Data Flow: Two streams of data are handled by the system. The first is the measurement data on which calibration and computation operations are carried out. The second, asynchronous with the first, consists of commands derived from the front panel or IEEE 488 I/F and controls the measurement circuits and the computation programs. Operations on the measurement stream basically consist of acquiring the raw data from the A-D converter, calibrating this data and carrying out any other computations, and converting and formatting the data for output. Note that a job consuming data is given higher priority than the one producing data for it, allowing a producer to place data into an empty buffer. The consumer is activated by a flag, set by the producer to indicate data ready in the buffer.

Processing Control: Control of the instrument by the processor, initiated from the front panel or digital interface, is arranged by using a 'pipeline control' of the major system state and a 'first in/first out' buffer between the interrupt level routine receiving the control command and the main program implementing it. The major system state consists of the range, function, resolution, filter, ratio, autorange, etc., flags and the computation mode (reading, A–B, ÷C, etc.). The pipeline comprises three levels. The top, level 1, reflects the state being programmed, the second, level 2, the state of the measurement circuits and the third, level 3, the measurement being processed. When a command is input, level 1 is updated (e.g. a new range is selected) and as soon as the measuring circuits are not converting an input signal, the state in level 1 is moved to level 2 causing the measurement circuits to update to the new state. When an A-D conversion is complete, data is read from the A-D and the state transferred from level 2 to 3, providing information for the processing routines. Additionally, at this time, the level 1 to level 2 transfer is repeated and the measurement circuits again updated to allow for commands received while the conversion is in progress.

A second control mechanism used is to input all the commands via a 'first in/first out' buffer between the interrupt level routine receiving the command and the main program implementing it. Thus the processor under remote control is able to 'simultaneously' set up the requirements for the next reading, convert the current reading and process the last one.

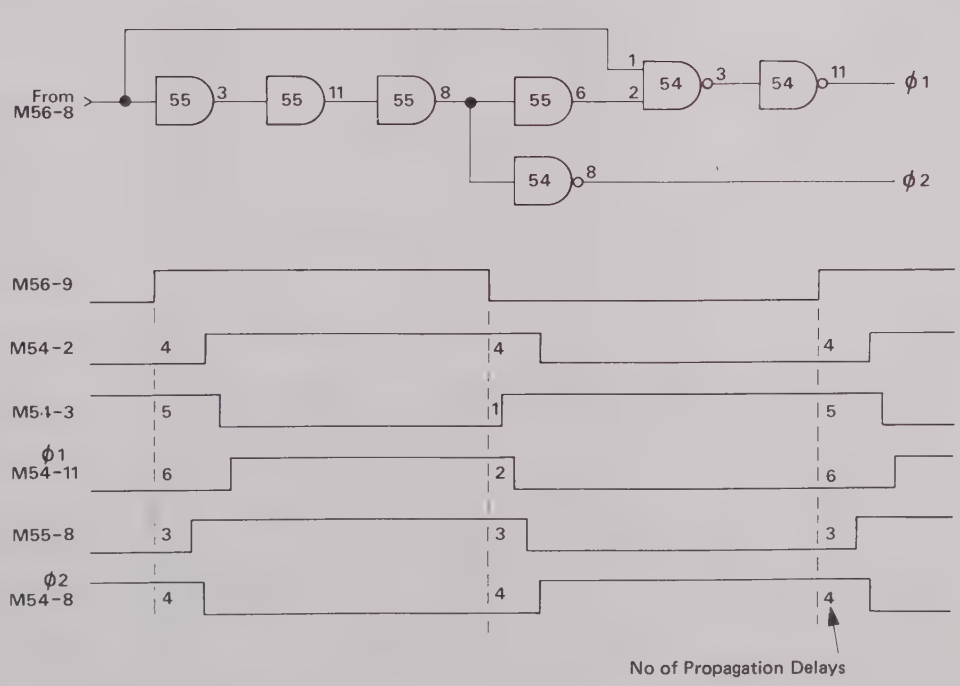


FIG. 3.35 TWO-PHASE CLOCK GENERATION

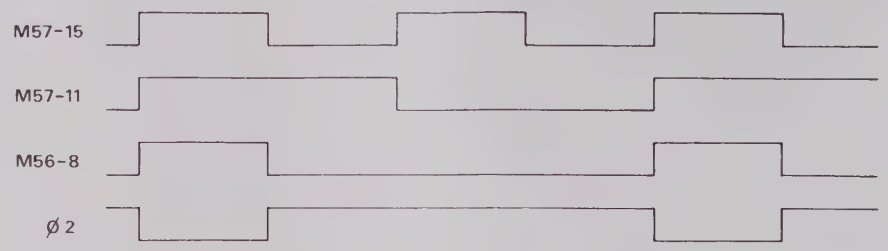


FIG. 3.36 TIMING DIAGRAM OF STRETCHED TWO-PHASE CLOCK

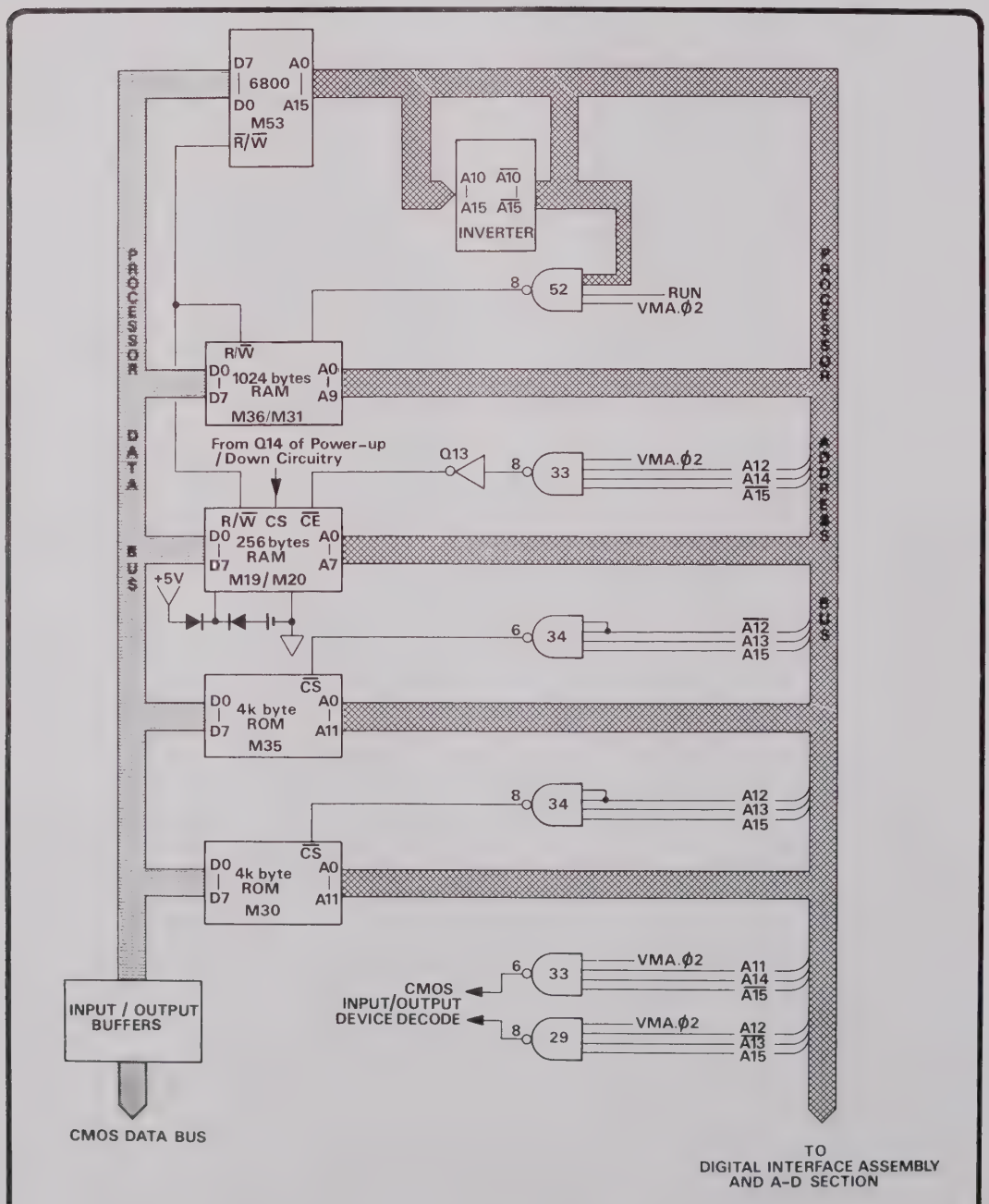


FIG. 3.37 SIMPLIFIED DIAGRAM OF MEMORY CIRCUITS

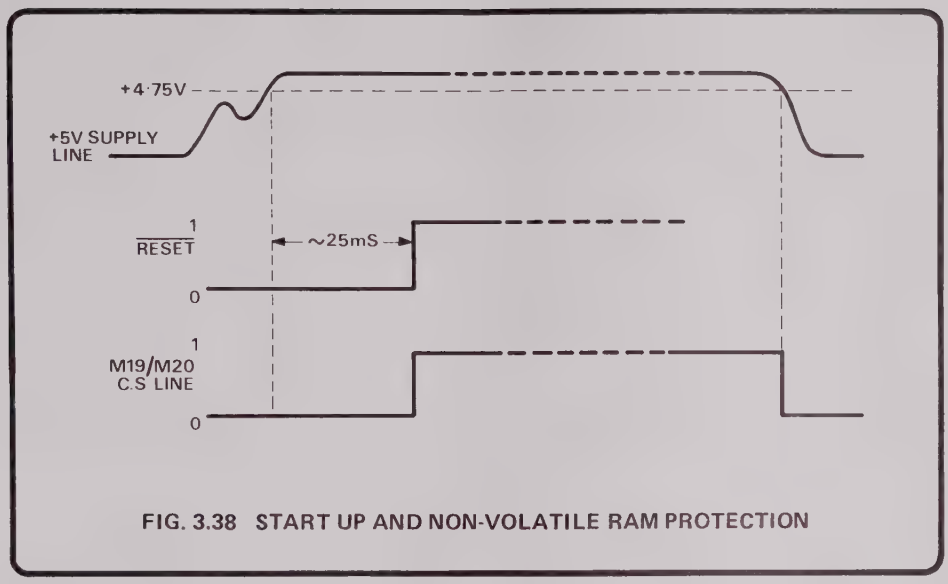


FIG. 3.38 START UP AND NON-VOLATILE RAM PROTECTION

3.8.1.2 The Two-Phase Clock

The 6800 requires a non-overlapping positive two-phase (Ø1, Ø2) clock and is derived from the line locked master clock (sheet 4) producing a 1.6MHz (50Hz supply) or 1.9MHz (60Hz supply) signal. M57 acts as a ÷2 thus antiphase 800kHz square-waves appear on pins 14 and 15. If data is not being transferred to the CMOS Bus, M57-11 is high, thus M56-8 follows M57-15. The non-overlapping of Ø1 and Ø2 is produced by the utilisation of the inherent propagation delay (approx. 10nS) through each gate of M54 and M55. This is best seen by referring to Fig. 3.35 the circuitry around the output stage increasing the voltage levels demanded by the processor (0V and +5V).

During a period when data is being transferred across the CMOS Data Bus, Ø1 and Ø2 are reduced to 400kHz by utilising the other half of M57. The signal CMOS I/O is high thus a 400kHz square-wave is output on M57-11, the waveforms of Ø1 and Ø2 are altered such that one half of the period is stretched, covering 1½ cycles of the normal 800kHz operation. (See Fig. 3.36).

3.8.1.3 RAM/ROM Circuit

The 6800 uses two ROM's which contain the programs necessary to run the instrument. Each ROM is able to store up to 4096, 8 bit 'words' of program information which are grouped in program modules. Both ROM's receive the address information output by the processor on to the Processor Address Bus. The particular ROM to be addressed being selected by decoding three of the address lines and applying the resultant to the 'chip select' line (via M34 pins 6 or 8) (See Fig. 3.37).

The information held in that particular location is sent back to the processor via the Processor Data Bus.

The processor also uses 1280 bytes of 8-bit wide RAM. 256 bytes of this memory (two 256 x 4-bit RAMs M19/20), are backed up by a battery to provide the non-volatile calibration and zero store which can only be over-written when 'CAL' or 'Zero' is selected. The remaining 1024 bytes, (two 1024 x 4-bit RAMs M36/31), are used as operating memory for scratch pad operations, and for storing volatile data (e.g. Max, Min). A particular location is set by the 6800 on the Process Address Bus using A_0 to A_9, the pair of the RAMs being selected by decoding other address lines with VMA.Ø2. Control of the read/write lines is performed by the MPU, the signal being gated with a 'Master Clock ÷ 2' signal to provide correct timing.

An instrument power up is detected by M60/M62 causing an initialisation $\overline{\text{RESET}}$signal to be fed to the MPU via Q16. (See Fig. 3.38).

During a power-up or power-down (+5V supply line $<$ +4.75 V) a signal from the supply-level detectors prevents RAMS M19 and M20 from being overwritten by holding the CS (chip select) lines low ($<$0.2 volts) via Q14 for a period of approx. 25mS determined by R55/C32.

3.8.2 CMOS Address Decode and Input/Output Circuits (430422 sheet 2)

Information is transferred to and from CMOS devices via the CMOS Data Bus during periods when the signal CMOS I/O is high (M33-6). This takes place when the Processor Address Bus bits A11, A14 and A15 are high. The transfer of data between the Processor Data Bus and the CMOS Data Bus takes place at 400kHz, the Read/Write lines selecting the direction of information through the tri-state buffers M4, M5 and M6.

In order to uniquely address the various CMOS input/output devices, the address lines must be further decoded. M16 and M32 are dual 2 to 4-line decoders using the states of CMOS I/O and address lines A0, A1, A4, A5 to enable or partially enable the input/output devices, except the output of M16 pins 2 and 15 which are inverted and gated with data line A2 to produce the required decode.

A5	A4	A2	A1	A0	SIGNAL	M32/M16 Pin No.	Operation
0	1	X	X	X		(M32-6)	Forces a MPU 'power up' sequence
1	0	1	X	X	$\overline{\text{XADDT}}$	M32-5	A-D main counter output enable
1	1	X	X	X		(M32-4)	Analog interface address latch input enable
1	0	X	0	0	$\overline{\text{XADSTA}}$	M16-9	A-D, and interupt status output enable
1	0	X	0	1		M16-10	Error switch output enable
1	0	X	1	0	$\overline{\text{XADCTL}}$	M16-11	A-D control latches, input enable
1	0	X	1	1	$\overline{\text{XADDLY}}$	M16-12	A-D delay counter input enable

FIG. 3.39 CMOS ADDRESS DECODING

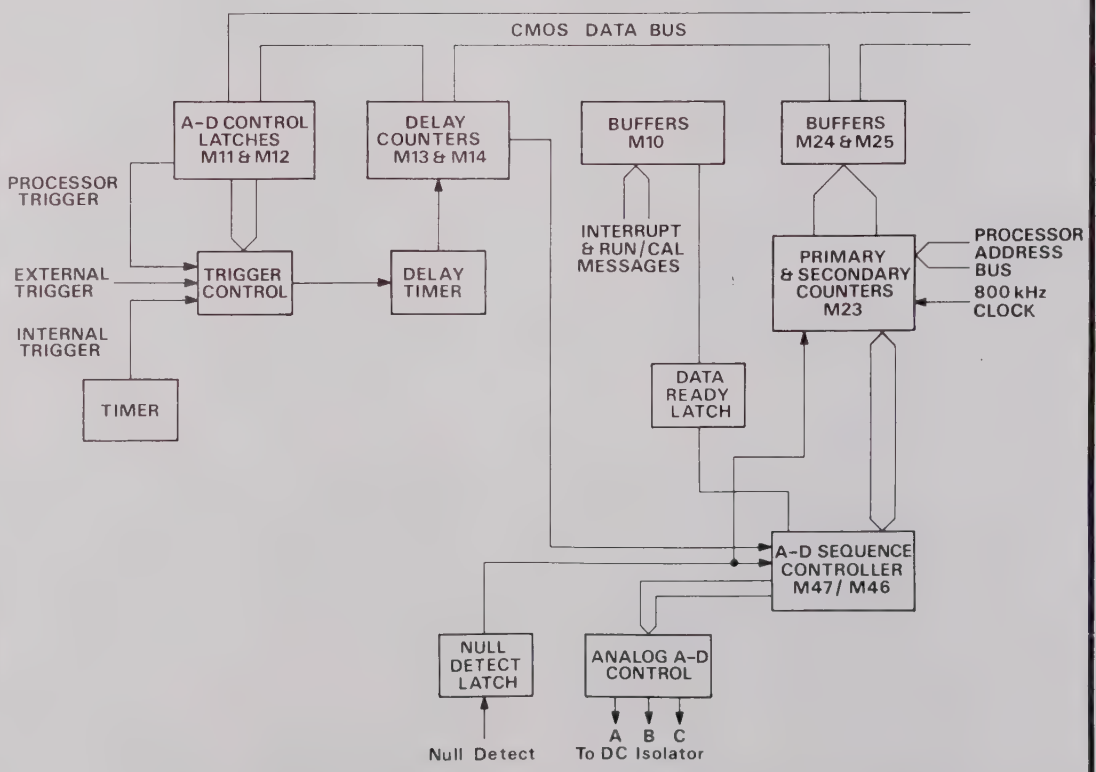


FIG. 3.40 SIMPLIFIED DIAGRAM OF DIGITAL SECTION OF A–D CONVERTER

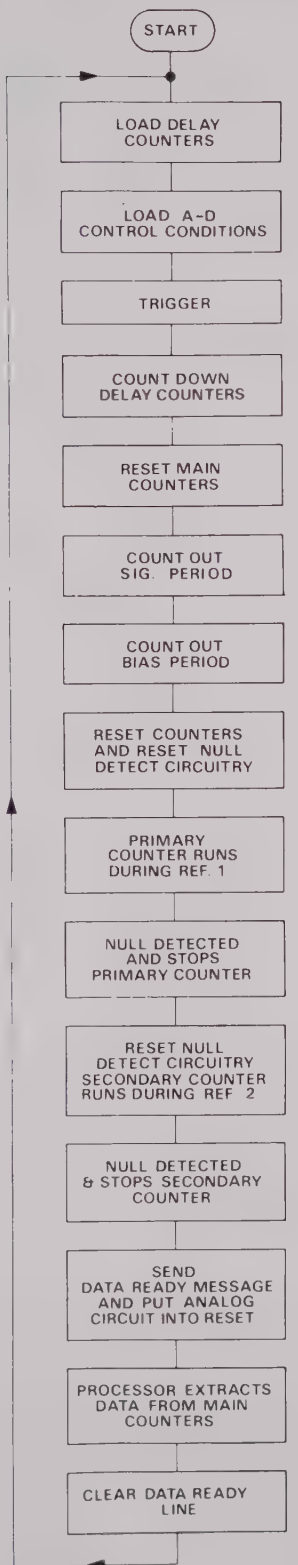

START
LOAD DELAY COUNTERS
LOAD A-D CONTROL CONDITIONS
TRIGGER
COUNT DOWN DELAY COUNTERS
RESET MAIN COUNTERS
COUNT OUT SIG. PERIOD
COUNT OUT BIAS PERIOD
RESET COUNTERS AND RESET NULL DETECT CIRCUITRY
PRIMARY COUNTER RUNS DURING REF. 1
NULL DETECTED AND STOPS PRIMARY COUNTER
RESET NULL DETECT CIRCUITRY SECONDARY COUNTER RUNS DURING REF 2
NULL DETECTED & STOPS SECONDARY COUNTER
SEND DATA READY MESSAGE AND PUT ANALOG CIRCUIT INTO RESET
PROCESSOR EXTRACTS DATA FROM MAIN COUNTERS
CLEAR DATA READY LINE

FIG. 3.41 FLOWCHART OF A–D DIGITAL SECTION

3.8.3 Analog to Digital Conversion (Digital Section)

3.8.3.1 General Principle

Block diagram Fig. 3.40 outlines the essentials of the digital section and should be used with flowchart Fig. 3.41 in order to follow the operation of this section.

The function of this section of the circuitry is to generate the sequence that when transferred to the analog section, controls the sequence from RESET through the integration cycle and back to RESET. The circuitry controls the length of SIG and BIAS and counts during REF 1 and REF 2, the accumulated count being proportional to the length of the reference periods, which in turn is proportional to the measured input signal. At the end of each reading cycle the count is read by the MPU, processed and displayed.

3.8.3.2 Preset Procedure

As part of the initialisation routine (at switch on), M47 (used as the sequence controller), is reset from M37-11, causing M47-2 to be logic '1'. Thus the control lines $\overline{A}$, $\overline{B}$ and $\overline{C}$ put the analog section of the A-D into RESET (See Fig. 3.42). The Address Bus decoded signal XADDLY is taken low, enabling the presetting of the delay counters M13 and M14 from the CMOS Data Bus, the amount of delay being determined by the selected range, function and filter state, see Fig. 3.43. The A-D control latches, M11 and M12 are then enabled by $\overline{\text{XADCTL}}$ to (i) reset the command latch M1 (from M11-4), (ii) set the resolution of the main counter (M11-5 and 6), (iii) select trigger gate (M12-3, 4 or 5) and (iv) reset the data ready latch (M12-6).

SIGNAL	$\overline{A}$	$\overline{B}$	$\overline{C}$
RESET	1	1	0
SYNC	1	1	0
SIG	1	1	1
BIAS	0	1	1
WAIT	0	1	1
REF 1	1	0	1
REF 2	0	0	1
END	1	1	1

FIG. 3.42 A-D ANALOG SEQUENCE CONTROL SIGNALS

FUNCTION	1065 COUNT	
	$\overline{\text{FILTER}}$	FILTER
DC Volts	2	101
AC Volts	46	151
DC + AC Volts	46	151
Ohms	2(1)	101(1)

(1) 1MΩ Range $\overline{\text{FILTER}}$: 4, FILTER : 121
10MΩ Range $\overline{\text{FILTER}}$: 31, FILTER : 251

FIG. 3.43 COMMAND DELAYS

3.8.3.3 A-D Measurement Sequence

Trigger. The trigger, required to initiate the measurement sequence, is generated from one of three possible sources:

1. Internally generated 3/second trigger, from timer M61-7.
2. Externally generated trigger, from EXT TRIG on rear panel via M24-13.
3. A MPU derived trigger from M11-3 generated when auto-ranging, pressing MANUAL when HOLD selected, during calibration, an INPUT ZERO sequence or via the digital interface.

The trigger source is selected by the latched data on M12, enabling one of the three gates of M2.

Delay. The trigger pulse clocks the 'command latch' M1 causing the timer, M15, to output clock pulses (200Hz) to the delay counters (M13 and M14) after a delay of approx. 1.5mS set by C5, R8, R9, R11. The delay counters proceed to count down to zero, at which time the delay latch (M26) is clocked. Thus M26-14 becomes a logic '1', enabling the sequencer M47 (an octal counter) to proceed on to the next step via M46-2.

SYNC. The SYNC phase from the sequencer resets the counters of M23 and places the analog section of the A-D into SIG. The pulse is fed back to M47 via M46-3 to step on the sequencer.

SIG. During the time the SIG line is high (M47-3), the primary counter in M23 is enabled and counts out the signal period (2.5mS superfast or 20mS normal mode). At the end of this period, M23-23 goes high and passes via M46-10 enabling the sequencer to step on once again.

BIAS. The BIAS signal (M47-7) is transferred to the analog section of the A-D by changing the state of the $\overline{A}$ line (M38-9 to a logic '0'). BIAS also enables the secondary counter of M23 to count out the BIAS period (20μS). The signal indicating the end of this period is passed via M46-9 causing the sequencer to carry on to the next step. The BIAS signal also resets the 'delay latch' (M26) ready for the next measurement cycle, and the 'null detector' latch (M22A).

WAIT. The WAIT pulse resets the counter of M23 via M39-10, keeps the $\overline{A}$ line to the analog section low, clocks the polarity null detect latch M22(B) causing a logic '1' on pin 1 if the signal applied to the analog section of the A-D converter was positive (logic '0' if negative) and is fed back to enable the sequencer via M46-3.

REF 1. The high to low edge of WAIT causes the $\overline{A}$ to change state and going into REF 1 makes $\overline{B}$ a logic '0'. The analog side is then in the condition to start 'ramping down'. While REF 1 is high the primary counter of M23 is enabled (pin 3) and counts the period of REF 1.

REF 1 is ended when a null detector pulse is detected and latched on to M22. This causes the sequencer to step on once more from M46-3, the low to high edge from pin 4 disabling the primary counter.

REF 2. The REF 2 signal changes the state of the $\overline{A}$ line (causing the analog section to ramp down at a slower rate), reset the 'null detect' latch and enable the secondary counter of M23 (Pin 13) to count the period of REF 2. If the secondary counter overflows the primary counter is incremented from M26-16.

As in REF 1, a null detector pulse causes the counting period to end (M26-13) and increment the sequencer via M46-3 causing the $\overline{A}$ and $\overline{B}$ lines to change state.

END. The low to high edge from M47-10 is fed back to M47, via M48-6 giving a master reset. Thus the sequencer is placed into RESET.

RESET. The sequence pulse from M47-2 clocks the 'data ready' latch M1-3 placing a signal on to the CMOS Data Bus via tri-state buffer M10 indicating to the MPU that a reading is ready to be taken from the main counter M23. Data is extracted from the counters in three bytes (controlled by the A1 and A0 lines of the processor address bus) with the counter output buffers, M24 and M25 being enabled by $\overline{\text{XADDT}}$, a decoded processor address.

The RESET signal is also passed to the analog section of the A-D by changing the state of the C line.

Once the data has been extracted from the main counter the set-up procedure is then repeated to await a further trigger.

3.8.3.4 Master Clock and Line Locking (430422 sheet 4)

To give improved rejection of line frequency related noise, the 1065 is linelocked. The line frequency is sampled and compared to the internal master clock. Synchronisation is achieved by adjusting the master clock frequency.

A sinusoidal line frequency signal from the 5V mains tap is converted to a square-wave (M25-13) and ÷2(M26-1) before being fed to the comparator section of the ULA M23 (sheet 3). The MASTER CLOCK ÷2 signal is fed to ripple counter M27 which outputs a signal of twice the estimated line frequency, for line related periods, controlled by the ULA (M23-18). This signal is fed to M23-19 (via inverter M39) and after a further ÷2, is compared with the actual line frequency (see Fig 3.44).

The ULA determines whether the master clock is running too slow or too fast, producing a signal on pin 20 whose pulse-width is proportional to the difference. The output of pin 21 is a 25Hz square-wave which is fed to the up/down input of counters M41/50. Thus depending on the position and down period of the pulse, the count held is increased or decreased.

Latches M42/51 are updated with this new count during the A-D RESET period and applies the count to resistor network AN4 which forms a D-A converter. Changing the voltage applied to varicap D9 alters its capacitance, thus adjusting the LC of the Colpitts oscillator. Therefore the frequency of the Master Clock is increased or decreased to be an exact multiple of the mains frequency.

3.9 FRONT PCB ASSEMBLY (Circuit Drawing No. 430417)

The front pcb assembly performs the following functions:

1. Accepts the analog measurement signals.
2. Provides manual control of the measurement circuits and data conditioning, via the microprocessor data bus.
3. Digitally decodes and displays measurement values and instrument messages input from the microprocessor data bus.
4. Visually indicates the selectable instrument states.

3.9.1 Analog Input Signals

The signals applied to the front panel input terminals are routed directly to the rear panel board via the L.H. pcb. The Hi, I+, Lo and I– tracks are shielded by guard tracks throughout.

3.9.2 Keyboard and Display. (Circuit drawing No. 430417)

The front pcb houses the functional and range keys (S1 - S18) with associated LEDs (SD1 - SD18), and the 8 segment, 11 block digital displays (block 9 not used). These are served by the Programmable Keyboard/Display Interface M1 and scan decoder M3.

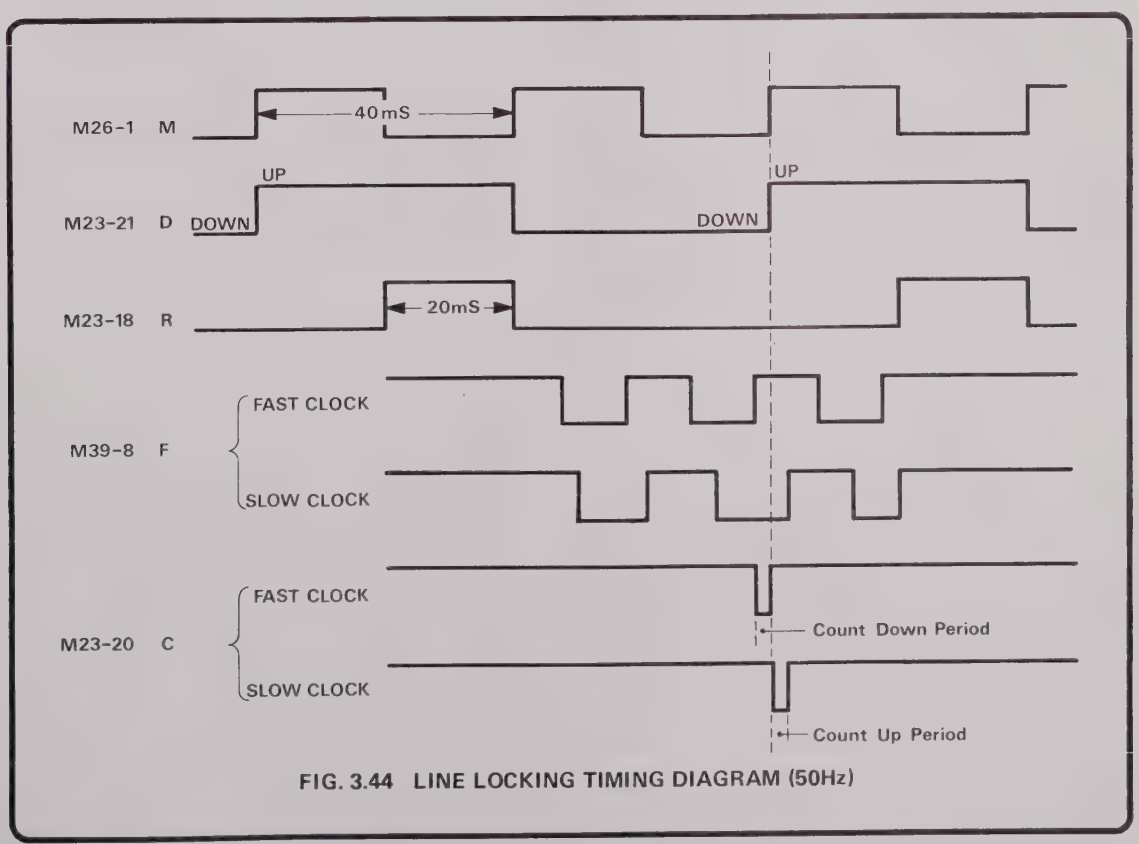


FIG. 3.44 LINE LOCKING TIMING DIAGRAM (50Hz)

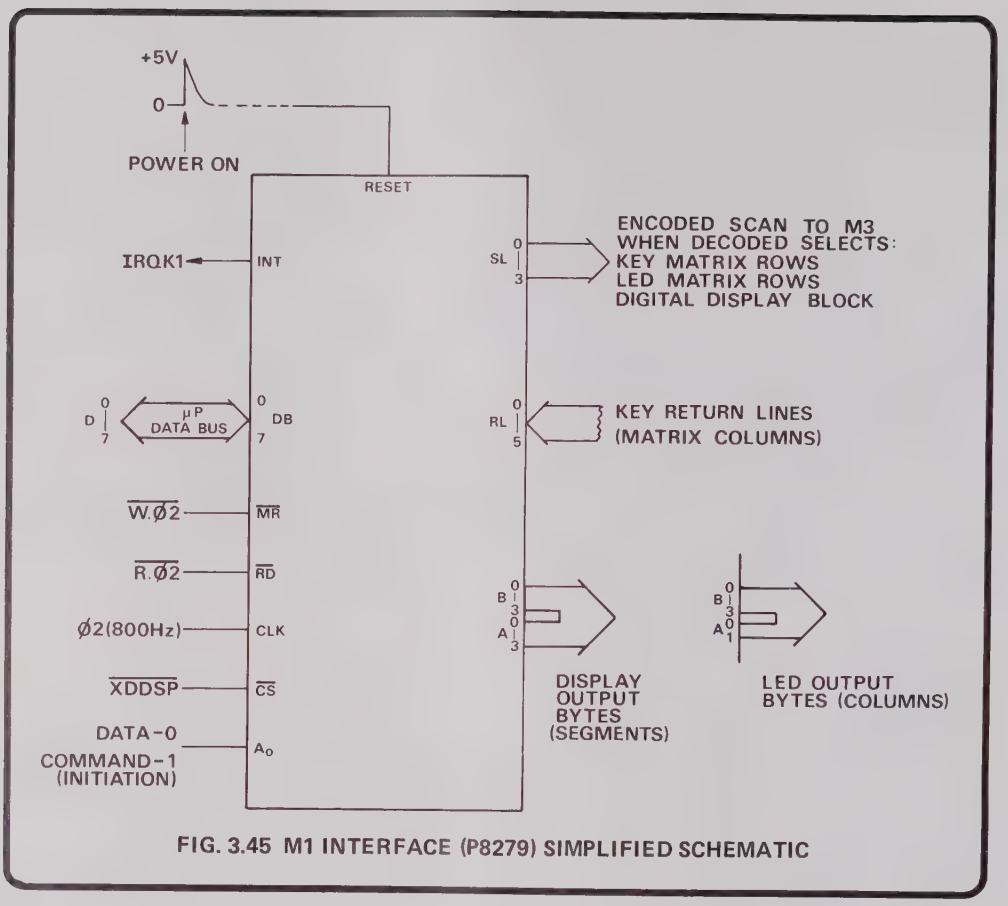


FIG. 3.45 M1 INTERFACE (P8279) SIMPLIFIED SCHEMATIC

3.9.3 Programmable Interface M1 (Fig. 3.45)

M1 interfaces the keyboard, LEDs and display to the instrument data bus. It is addressed by $\overline{XDDSP}$ from the digital pcb to chip-select $\overline{CS}$, which enables either command or data flows via the data bus. For data flow, the processor address: Ao = 0, and for programming the interface during initialisation: Ao = 1. Commands and data flow via DB_0-DB_7.

3.9.4. Read/Write Control

The processor R/$\overline{W}$ signal is decoded into $\overline{WR}$ and $\overline{RD}$ by M2 and synchronised with the processor Ø2 clock. Data or Command is input to M1 from the processor data bus on $\overline{WR}$ low, and $\overline{CS}$ low is latched on the $\overline{WR}$ positive-going edge. Data is output from M1 onto the databus during $\overline{RD}$ low and $\overline{CS}$ low. Naturally $\overline{WR}$ low AND $\overline{RD}$ low is an excluded combination.

3.9.5 Initialisation Commands

On power up M1 is cleared by a RESET input pulse of time constant 10ms. The interface is then programmed during initialisation as follows:

Clock divider set to ÷8 - The Ø2 clock at 800KHz is divided by 8 to give internal clock frequency of 100KHz. An inherent division by 16 reduces the scan clock to 6.25KHz giving approx. 400Hz scan cycling frequency.

Encoded Scan - The scan output from SL_{0-3} is a 4-bit binary count. SL_3 = MSB, SL_0 = LSB.

Keyboard Mode - The internal keyboard RAM is programmed as FIFO, input via RL_5 - RL_0 return lines. N-key rollover is employed with debounce. (Selective 2-key lockout performed by main software).

Display Mode - 16 x 8-bit character display with left entry, to accommodate both LEDs and display. The internal scan multiplexes LEDs with display blocks, (see fig. 3.46), on output port B_{0-3} A_{0-3}.

M1, SL_{0-3} SCAN OUTPUT				M3 OUTPUT (Low Active)	ENERGISED LINE (Display and Keyboard)
SL_3 Data 4	SL_2 Data 3	SL_1 Data 2	SL_0 Data 1		
0	0	0	0	S_0	A8 (display Anode 8)
0	0	0	1	S_1	K upper row (S7-12)
0	0	1	0	S_2	A3
0	0	1	1	S_3	A5
0	1	0	0	S_4	K middle row (S1-6)
0	1	0	1	S_5	A7
0	1	1	0	S_6	K lower row (S13-18)
0	1	1	1	S_7	A11
1	0	0	0	S_8	A2
1	0	0	1	S_9	K upper row (S7-12)
1	0	1	0	S_{10}	A4
1	0	1	1	S_{11}	A6
1	1	0	0	S_{12}	K middle row (S1-6)
1	1	0	1	S_{13}	A1
1	1	1	0	S_{14}	K lower row (S13-18)
1	1	1	1	S_{15}	A10

FIG 3.46 KEYBOARD AND DISPLAY SCAN ENERGISING SEQUENCE

3.9.6 Keyboard and Display Scan

The encoded scan output from M1 (approx. 400Hz cycle frequency at SL_{0-3}) is decoded by M3 to energise each key and its associated LED twice in every scan cycle, and each display block once in every scan cycle. In addition, the Display Blocks are activated alternately to avoid inter-block "streaming".

3.9.7 Key selection (Drawing 430417 sheet 1)

The keys are electrically grouped in a matrix of 3 rows of 6, as laid out in Drawing 430417 sheet 1. (NB. This does not conform to their physical grouping on the front panel). The six return lines RL_{0-5} define columns in the matrix and the rows are scanned by SL_{0-4}. The internal keyboard RAM receives the column information, and its internal scan is synchronised to SL_{0-4}, uniquely recognising each of the eighteen keys. The use of "N-Key Rollover" mode debounces single key depressions, and simultaneous key contacts are recognised and stored. Any Key depression initiates the interrupt IRQK1 to the microprocessor, which identifies the keys. The DVM main program software performs 2-key lockout except for AC and DC function keys, which may be selected together for the AC + DC RMS function of the instrument.

3.9.8 Key LED operation

After performing the range or functional change requested by the key depression, the microprocessor reselects the state of the assigned LED bits in M1 internal display RAM. As the display RAM is scanned internally in synchronism with the decoded scan outputs of M3, each LED output byte on B_{0-3} A_{0-1} drives the row of LEDs accessed by M3 output lines (Fig. 3.46 refers). The bit-pattern of the byte selects the LEDs to be lit in that row. (B_{0-3} A_{0-1} bits high = unlit, low = lit). Transistors Q1-7, Q10-14 provide the energising currents.

3.9.9 Digital display operation

When the microprocessor system has data to display, it is transferred into M1 internal display RAM via the data bus at M1-DB_{0-7} reselecting the bit-patterns of the assigned display bytes. Each display output byte on B_{0-3} A_{0-3} drives a specified digital block, energised in synchronism by M3 decoded outputs (see Fig. 3.46). This may be illustrated by an example:

Say block 4 on the display is to be a figure 6. M3 selects display anode A4 (S_{10} on M3-20 - low) during its scan. Q16 conducts to raise A4 from −70v to +3.5v, the other anodes remaining at −70v.

Simultaneously, M1 internal scan sets the block-4 byte on A_{3-0} B_{3-0} to 10001000 (for figure 6). Switch transistors Q_5 and Q_9 remain cut off, with collectors at digital common. For bits at logic 0, switch transistors Q8, 10, 11, 4, 6 and 7 conduct, and their collector potentials rise. This rise is passed through line capacitors C6, 10, 12, 7, 11 and 13, reverse-biassing their DC restoration diodes and drawing base current through their driver transistors. The resulting collector currents pull the selected segment cathodes from −70v to almost −175v, striking the gas discharge on segments A, C, D, E, F and G only of block 4. The driver emitter-resistors control the segment cathode currents for uniform display brilliance, and the charging time for the line capacitors.

3.9.10 Keep-alive electrodes

Four keep-alive electrodes in each digit block (2 anodes and 2 cathodes) are maintained at +5v and −175v respectively. All main block anodes and segment cathodes are held at −70v (D14 anode) except when activated. This ensures rapid discharge when energised, and helps to avoid inter-block "streaming".

3.9.11 Blanking

Spurious flashes on LED and digital displays are avoided by blanking. As M1 display and LED drive outputs change from one byte to the next, A_{3-0} B_{3-0} lines are set to logic 1 for 150μS. This causes a partial discharge of the line capacitors through the DC restoration diodes, turning off the drive transistors and blanking the display. The multiplex scan frequency is high enough, so that this blanking cannot be observed visually.

3.11 IEEE 488 STANDARD DIGITAL INTERFACE (Circuit Drawing No. 430427)

The IEEE Digital Interface assembly contains the extra memory and circuitry required for the execution and decoding of interface functions, and to perform data input/output transfers. Simplified diagram Fig. 3.47 shows the essential features of this board.

3.11.1 ROM Circuit

The IEEE Digital Interface assembly acts as an extension to the Digital assembly with connections to both the Processor Address and Data Buses. The board contains 4k bytes of program memory (M3) containing the subroutines to control the instrument from the IEEE 488 Bus. The ROM receives the address information, with chip selection being made by decoding address lines A3-A11 with $\overline{\text{XIOBD}}$.

3.11.2 Interface Circuit

The General Purpose Interface Adapter (GPIA). M9, provides the interface between the IEEE 488 Standard Instrument Bus and the 6800 microprocessor. The MPU can receive, process and send messages to the interface through the GPIA.

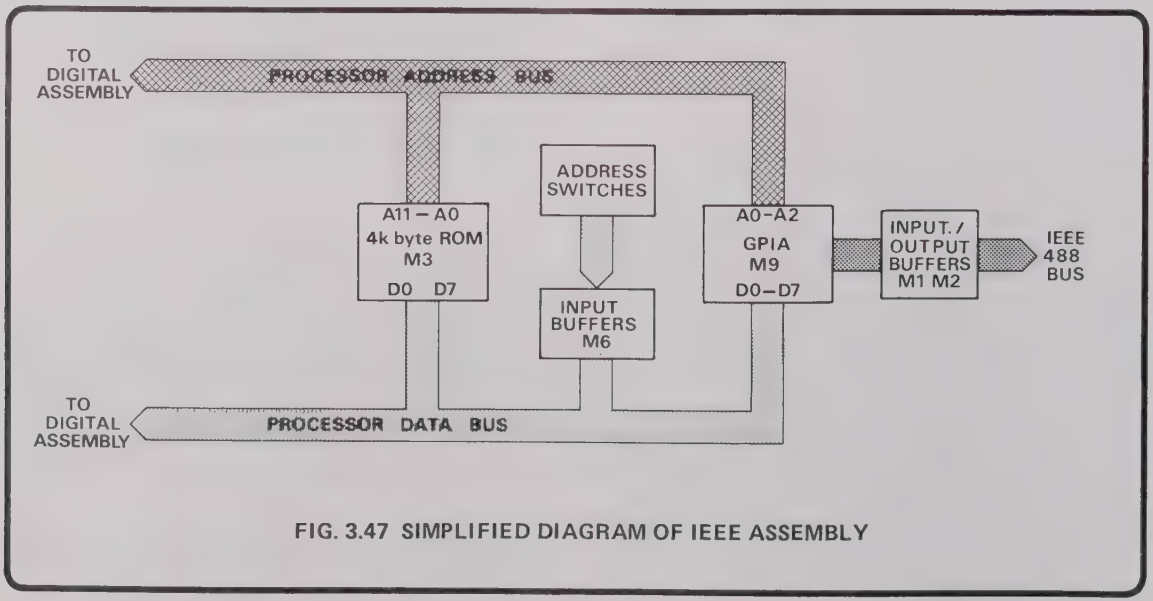


FIG. 3.47 SIMPLIFIED DIAGRAM OF IEEE ASSEMBLY

The GPIA is able to automatically handle the following interface protocol[1] :–

Single address capability
Source and acceptor handshake
Talker and Listener states
Service Request
Parallel Poll
Device Clear
Device Trigger

With the MPU it is also capable of:–
Programmable Interrupts
Storing the instrument's address
Control of the interface input/output buffers.

The GPIA is selected by decoding address lines A3-A11 with $\overline{\text{XIOBD}}$. Address lines A0-A2 with the state of the MPU R/$\overline{\text{W}}$ line select one of the 8 read-only or 7 write-only registers in the GPIA, enabling the MPU to send or receive data over the interface.

The two signals T/$\overline{\text{R}}$1 and T/$\overline{\text{R}}$2 are used to control low power transceivers (formed from M1, 2) which drive the interface bus.

[1] For further information refer to 'Getting aboard the 488 Bus' published by Motorola.

3.13 REAR (POWER SUPPLY AND REAR INPUT) PCB ASSEMBLY) Circuit Drawing No. 430418)

3.13.1 General

The line transformer and power supply components are situated at the rear right hand side of the instrument, when viewed from the front. Transformers T1 and T2 are of toroidal construction mounted one on top of the other and bolted to the rear panel. T1 has a split primary comprising two 115V windings, intended for either series or parallel connection depending on the line voltage. An earth screen is interposed between primary and secondary windings to minimise electrostatic coupling, and is grounded to line earth. The second transformer T2 is driven from T1. It also possesses an electrostatic screen, this time being connected to Guard.

The Rear PCB assembly also contains the switching circuitry to enable one of two analog signal sources to be connected to the measurement circuits of the DVM.

3.13.2 180V Supply

The 180V supply is required for the gas discharge display. Bridge rectifier W1 and C6 convert the 200V AC from the secondary of T1, to DC. R6, D3, R4 and Q2 act as a constant current source being regulated by D4, R5 and Q1. The +5V line (TP2) is connected to the digital +5V line on the Front PCB assembly.

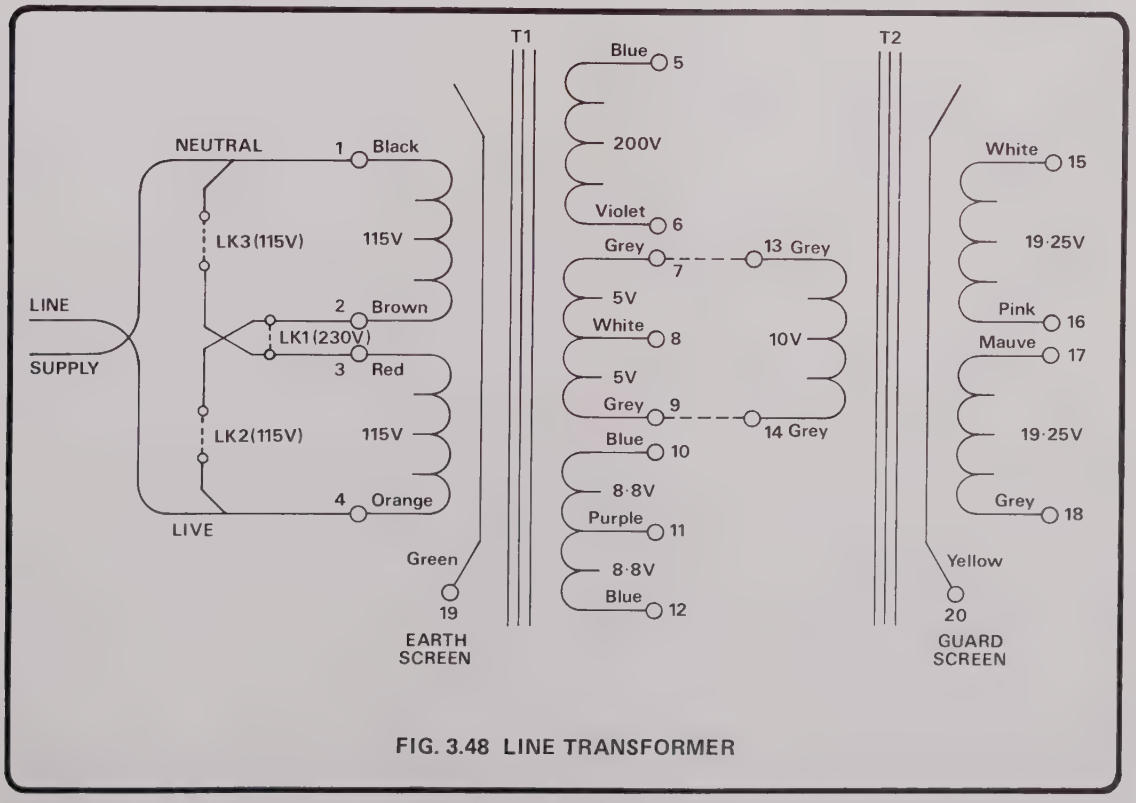


FIG. 3.48 LINE TRANSFORMER

3.13.3 5V Supply

All the logic circuitry to the right of the central printed circuit board is powered from the supply generated from the two 8.8 volt 750mA secondary windings on transformer T1. The centre tap (digital common) is referenced to line earth via a 100kΩ resistor, R1 in parallel with a 100nF capacitor, C1. The output of rectifying diodes D1 and D2 is smoothed by C7 and C8 before being fed to regulator M1. This regulator is capable of 1 amp output and has foldback current limiting and thermal shut-down, to provide short circuit protection.

3.13.4 ±15V Supply

The third secondary winding of T1 (10V centre-tapped) drives the primary of the ±15V Analog supply transformer T2. The two 19.25V secondary windings of T2 are connected in series by an external short to leads 16-17 at J6-5/8. This centre tap is connected to analogue common. The output of bridge rectifier W2 is fed to voltage regulators M2 and M3 (wired in series), to produce positive and negative 15 volt supplies to power the analog circuitry. These regulators also include foldback current limiting and thermal shut-down, to provide short-circuit protection.

3.13.5 Front Panel/Rear Panel Input (Drawing 430418 Sheet 2)

When Front Input is slelected, either remotely or on the front panel, this causes the base of Q3 to be connected to 0 volts, turning on the transistor. Thus relays RL1 and RL2 are energised, causing the front signal input terminals to be connected to the measurement circuits. Should Rear Input be selected relays RL1 and RL2 are de-energised, connecting the rear input to the measurement circuits.

3.14 SELF TEST SEQUENCE

Selection of the TEST key places the instrument into a test routine, checking the display and basic measuring circuits. A flowchart for the routine is given in Fig. 3.49. The analog circuitry conditions for each test are given in the last subsection of the circuit description for the particular board, and the range 'F.E.T.' patterns in Appendix 1.

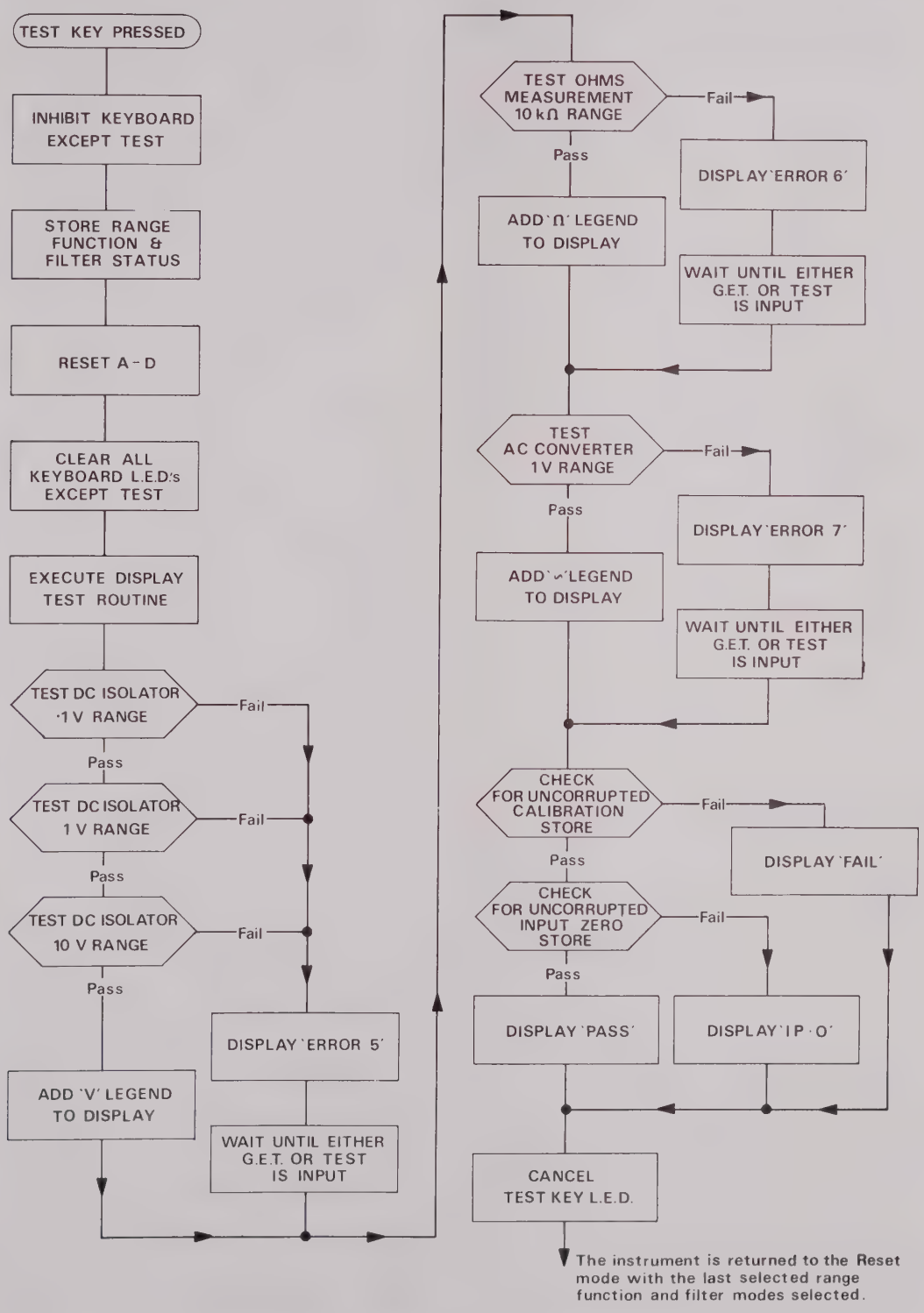


FIG. 3.49 FLOWCHART OF SELF-TEST ROUTINE

SECTION 4

INTERNAL ADJUSTMENT PROCEDURES

4.1 CHANGING LINE VOLTAGE AND FREQUENCY

The instrument is set to 50Hz, 205V to 255V supplies unless otherwise specified on the instrument identification label located on the rear panel. Alteration to a different line voltage/line frequency may necessitate an instrument recalibration.

4.1.1 Changing Line Voltage

1. Disconnect power and all signal input/output leads.
2. Remove the lower cover.
3. Locate the link(s) connecting the split primary on the printed circuit board in front of the toroidal line transformer, Fig. 2.1 and Drawing No 400418.
4. 115V Operation:– Remove LK1 (link 1) and fit LK2 and LK3[1].
   230V Operation:– Remove links LK2 and LK3, and fit LK1[1].
5. Amend instrument identification label.
6. Replace lower cover.
7. Replace power fuses with 160mA anti-surge (230V) or 500mA anti-surge (115V).
8. Carry out the Specification Verification tests (Section 7, User's Handbook) and recalibrate if necessary.

4.1.2 Changing Line Frequency

1. Disconnect power and all signal input/output leads.
2. Remove the top cover.
3. 400Hz Operation:– Remove link LK5 and fit LK7[1] on the Digital assembly, (Drawing No. 400422.
   50/60Hz Operation:– Remove link LK7 and fit LK5[1] on the Digital assembly (Drawing No. 400422).
4. Place instrument into 'Reset'. Adjust L2 (Digital assembly) so that TP7 is 1.05V ±0.03V with respect to Digital Common (TP28), with new supply ON.

NOTE: This signal contains about 200mV peak-to-peak high frequency noise.

5. Amend instrument identification label.
6. Replace the top cover.
7. Carry out the Specification Verification tests (Section 7, User's Handbook) and recalibrate if necessary.

[1] Links should be 22 SWG TIN.Cu wire with silicone rubber sleeving.

4.2 BATTERY REPLACEMENT

The battery should be replaced on or before the date indicated on the rear panel instrument identification label. To retain the calibration memory, the instrument must be powered-up during replacement. Therefore great care must be taken due to voltages up to 260 volts being present inside the instrument.

1. Remove top cover and locate battery on the Digital assembly (see Fig. 2.1).
2. Power-up instrument.
3. Desolder battery at end of tags and remove from clip.
4. Replace with new battery, (Datron Part No. 920049) positive terminal to resistor.
5. Replace top cover.
6. Amend instrument identification label (Current date + 5 years).
7. Carry out the Specification Verification tests (Section 7, User's Handbook) and recalibrate if necessary.

4.3 POST-REPAIR PROCEDURES

Apart from the RMS Module (which is available only from Datron), all integrated circuits and semiconductor devices are standard manufacturers' products, and special selection is unnecessary. During manufacture certain resistors are selected in value (FSV = Factory Selected Value) to accommodate circuit component tolerances, or to bring the desired setting of a preset control to the middle of its adjustment range.

The thermal tracking of the DC Preamplifier is particularly important, to ensure a low order of zero drift with variations of temperature. This rather time consuming procedure is carried out initially during manufacture, and need only be repeated following replacement of Q12 or any component associated with the temperature compensation circuitry.

NOTE: A routine calibration as detailed in Section 1 should be carried out after completion of the following procedures.

CAUTION : Up to 260 volts is present inside the instrument. Personal contact with these points may result in injury.

4.3.1 Basic DC Instrument

Equipment Requirements:

4½ digit Digital Voltmeter e.g. Datron 1041
Variable 5V, 1 amp DC supply
5mV/division Oscilloscope e.g. Telequipment D83
10MΩ5% resistor in parallel with 10nF capacitor
DC Voltage Calibrator, e.g. Fluke 332D with correction figures.

Procedure:

Power Supplies

1. Turn instrument on and allow 5 minutes warm-up period.

2. Connect DVM Hi to TP8 and Lo to TP28 on the Digital assembly. Adjust R2 on the Rear pcb assembly to give +5.100V ±25mV.

3. Connect DVM Hi to TP1 and Lo to TP20 on the Analog assembly. Adjust R7 on the Rear pcb assembly to give +15.000V ±15mV.

4. Connect DVM Hi to TP2 and Lo to TP20 on the Analog assembly. Adjust R12 on the Rear pcb assembly to give −15.000V ±15mV.

Digital Assembly

5. Switch the instrument off and disconnect the power lead.

6. Isolate the Digital Board by removing the connectors along the centre panel (J1-J5).

7. Connect variable 5V supply and DVM Hi's to TP8, Lo's to TP28. Reduce supply to 4.750V ±10mV.

8. Set R83 fully clockwise. Connect oscilloscope Lo to TP28 and monitor M35 pin 40. Turn R83 anti-clockwise until TP30 undergoes a high to low transition (or begins to pulse low).

9. Remove variable supply and reconnect items disconnected in steps 5 and 6. Disconnect the oscilloscope. Switch on the instrument.

10. Connect DVM Hi to battery positive terminal, Low to TP28. Check battery voltage is >2.5 volts.

11. Disconnect DVM and connect oscilloscope Hi to TP25, Lo to TP28. Adjust R11 to give a 5mS ±0.5mS period, mark-space ratio approx 100:1.
NOTE: This signal appears in short 'bursts' every reading.

12. Place instrument into 'Reset'. Connect oscilloscope Hi to TP7. Adjust L2 to give a stable +1.05V ±0.03V.
NOTE: This signal contains about 200mV peak to peak high frequency noise.

13. Insert calibration key into keyswitch on the back panel and turn, placing the instrument into CAL mode.
NOTE: The display CAL legend will be lit.

14. Short together pins 'D' and 'E' on Digital assembly.
NOTE: All the calibration store correction factors are now reset to zero.

15. Turn the calibration key back to RUN mode.

Analog Assembly (DC Isolator Section)

16. Centralize R150 and R160.

17. Select 0.1V range DC with 'Filter' out. Apply a 10MΩ resistor between instrument Hi and Lo. Connect DVM Hi to TP13, Lo to TP20.
Adjust FSV R152 with a metal film resistor (50ppm/°C) for a reading of < 10mV, using R159 for 'fine' adjustments.
Do not solder in R152.

18. Apply a short circuit across the input terminals and adjust R150 for a reading of <4mV ±0.1mV at TP13.

19. Connect DVM Hi to TP33 and adjust R160 for a reading of <20μV.

20. Repeat steps 17 to 19 until readings are within specified limits.

21. Select 100V range and apply short circuit between Hi and Lo. Connect DVM Hi to TP7, Lo to TP20. If reading is +6.42V ±0.03V proceed to step 23.

22. Switch off instrument and make positive reference links A to C, if cut i.e. the links alongside TP7. Switch on instrument and measure voltage on TP7 once again. Consult Fig. 4.1 and cut links as indicated. Repeat step 21.

Voltage on TP7 or TP8	TL'B'	TL'C'
6.42	–	–
6.47	–	✓
6.525	✓	–
6.58	✓	✓

Select voltage closest to measured value and cut links

FIG 4.1 REFERENCE SELECTION VOLTAGES

23. Connect DVM Hi to TP8. If reading is −6.42V ±0.03V proceed to step 25.

24. Switch off instrument and make negative reference links B and C, if cut i.e. the links alongside TP8. Switch on instrument and measure voltage on TP8 once again. Consult Fig. 4.1 and cut links as indicated. Repeat Step 23.

25. Select 'Reset'. Connect DVM Hi to TP9. Select correct resistance value for FSV R11 or R15 to give a reading of 0V ±1mV. Solder in resistor.

26. Deselect 'Reset' and disconnect DVM. Select 1000V range and apply −100mV. Connect oscilloscope Lo to TP21, Hi to TP5. Adjust R20 for noisy waveform at zero point.

27. Remove oscilloscope. Replace covers but do not replace screws. Select 10V, DC, filter out and apply s/c across input terminals. Turn rear panel key-switch to CAL mode and select LIN.

28. Select 10V range, 'Filter' and apply short copper link across input terminals. Select 'Zero'.

29. Apply +10 volts and select GAIN. Repeat until display reads +10.0000 ± ½ digit.

30. Apply +19 volts. If the display reads within the limits +18.9999 to +19.0001, proceed to step 32.

31. Calculate E = (19 - displayed reading)/2.
Re-apply +10 Volts and adjust R23 for a displayed reading of 10 - E.
Repeat steps 29-31 until both readings are within the limits indicated.

32. Turn rear panel keyswitch to RUN mode.

The basic DC only instrument set-up procedure is complete.

4.3.2 Ohms Assembly

Equipment Required :

5½ digit Digital Voltmeter e.g. Datron 1051 or 1061.
10MΩ5% resistor in parallel with 10nF capacitor.
Copper shorting links.

Procedure

1. Centralize R26 and R27.

2. Select kΩ, 10kΩ range and Rear and use the rear panel input. Connect I− to Ω GUARD, I+ to Hi and 10MΩ between Hi and Lo. Connect DVM Hi to TP4, Lo to TP1. Adjust R26 for zero ± 300μV.

3. Remove 10MΩ resistor and replace with a short circuit. Connect DVM Hi to TP14 and adjust R27 for zero ± 2μV.

4. Repeat steps 2 and 3 until readings are within specified limits.

The basic Ohms set-up procedure is complete.

4.3.3 AC Assembly

Equipment required:

4½ digit Digital Voltmeter e.g. Datron 1041.
5mV/division Oscilloscope e.g. Telequipment D83.
AC Calibrator e.g. Fluke 5200A.
5:1 asymmetric crest factor signal, 1 volt r.m.s., 0.02% accuracy.

Procedure

1. Select AC 1000V range and HOLD. Short Hi to Lo. Connect DVM Hi to TL7, Lo to TP8 and note reading. Select 1V range and adjust R121 (bias current) to give same reading ±10μV.

2. Select 1V range, AC + DC and adjust R112 (offset adjust) for an indication of zero ±50μV on the DVM.

3. Repeat steps 1. and 2. until readings are within the specified limits.

4. Select 10V range and HOLD. Connect oscilloscope Hi to TP5, Lo to TP8 and adjust R90 (rectifier zero) for maximum noise about zero. Remove the oscilloscope.

5. Connect DVM Hi to TP2, Lo to TP8 and adjust R75 (linearity) for an indication on the DVM of 5mV ±10%.

6. Select AC, 1V range, FILTER and apply 1V 500Hz. Connect DVM Hi to TL5, Lo to TP8. If reading is +3.157V ±0.01V proceed to step 8.

7. Disconnect input signal and switch off instrument, Make links TL1 to TL4 if cut. Switch on instrument, reselect AC, 1V range, FILTER and reapply 1V, 500Hz. Measure voltage on TL5. Consult Fig. 4.2 and cut links as indicated. Check voltage on TL5 is 3.157V ±0.01V. Remove the DVM.

Voltage on TL5	TL1	TL2	TL3	TL4
3.157	–	–	–	–
3.178	–	–	–	✓
3.198	–	–	✓	–
3.218	–	–	✓	✓
3.239	–	✓	–	–
3.259	–	✓	–	✓
3.280	–	✓	✓	–
3.300	–	✓	✓	✓
3.320	✓	–	–	–
3.340	✓	–	–	✓
3.360	✓	–	✓	–
3.380	✓	–	✓	✓
3.400	✓	✓	–	–
3.420	✓	✓	–	✓
3.440	✓	✓	✓	–
3.460	✓	✓	✓	✓

Select voltage closest to measured value and cut links

FIG 4.2 AC BOARD OUTPUT SELECTION VOLTAGES

8. Deselect HOLD and short circuit instrument Hi and Lo. Turn rear panel key switch to CAL mode and select ZERO. Repeat for all ranges.

9. Select 1V range. Apply 1 volt (d.c.) and note reading on display. Apply −1 volt (d.c.) and adjust R50 (d.c. turnover) for same display indication ±10 digits.

10. This part of the procedure must be performed with the high frequency compensation voltage, at J1-11/ R57, at −5V ±0.2V.

    a. Select AC 100V range, FILTER and apply 100V, 500Hz. Select GAIN. Apply 100V, 30kHz and adjust C62 for a display of 100.000V ±20 digits.

    b. Select 1V range and apply 1 volt, 500Hz. Select GAIN. Apply 1V 30kHz and adjust C63 for a display of 1.00000 ±20 digits.

11. Apply 1 volt 5:1 crest factor signal. Adjust R35 (crest factor) for a display of 1.00000V ±30 digits.

12. Open circuit input. Turn rear panel key switch to RUN. Select TEST and check for a display of PASS. Turn rear panel key switch to CAL.

13. Select 10V range and apply 10V, 30kHz. Check display is 10.0000V ±1200 digits. Check that the display can be calibrated to 10.0000 ±20 digits by less than 5 presses of the AC Hf key.

14. Select 1000V range and apply 1000V, 500Hz. Select GAIN.

15. Apply 1000V, 25kHz and check display is 1000.00V ±1200 digits. Check that display can be calibrated to 1000.00V ±20 digits by less than 5 presses of the AC Hf key. Remove 1000V and turn rear panel key switch to RUN.

    The basic AC set-up procedure is complete.

APPENDIX 1

ANALOG DATA LINE 'F.E.T.' PATTERNS

DC Voltage

Range	DC Isolator							
	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7
100mV	0	0	0	0	0	1	1	X
1V	0	0	0	0	1	1	1	X
10V	0	0	0	0	1	0	1	X
100V	0	0	0	0	1	1	0	X
1000V	0	0	0	0	1	0	0	X

AC Voltage

Range	AC assembly							
	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7
1V	0	0	1	0	0	0	0	X
10V	0	0	0	1	0	0	0	X
100V	0	0	0	0	1	0	0	X
1000V	0	0	0	0	0	1	0	X

DC Coupled AC Voltage

Range	AC assembly							
	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7
1V	0	1	1	0	0	0	0	X
10V	0	1	0	1	0	0	0	X
100V	0	1	0	0	1	0	0	X
1000V	0	1	0	0	0	1	0	X

Ohms

Range	DC Isolator								OHMS assembly							
	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7
100Ω	0	0	0	0	0	1	1	X	0	0	0	0	0	1	0	X
1kΩ	0	0	0	0	1	1	1	X	0	0	0	0	0	1	0	X
10kΩ	0	0	0	0	1	1	1	X	1	0	0	0	0	0	0	X
100kΩ	0	0	0	0	1	1	1	X	0	0	0	0	1	0	1	X
1MΩ	0	0	0	0	1	1	1	X	0	0	1	1	1	0	0	X
10MΩ	0	0	0	0	1	1	1	X	0	1	0	1	1	0	0	X

Test

Function Tested	Range Checked	DC Isolator								Other function assembly							
		AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7
DC	.1	0	0	0	0	0	1	0	1	None used							
	1	0	0	0	0	1	1	0	1								
	10	0	0	0	0	1	0	0	1								
kΩ	10	0	0	0	0	1	1	1	0	Ohms assembly 0	1	0	1	1	0	0	0
AC	1	Not used								AC assembly 0	1	1	0	0	0	0	0

Ø2

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R1	090001	PTC THERMISTER	MULLARD	VA8650	2
R2	008014	10M 5% 2500V MET-GLAZE	MULLARD	VR37	1
R3	090001	PTC THERMISTER	MULLARD	VA 8650	—
R4	000122	1k2 5% ¼W CARBON	MULLARD	CR25	8
R5	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R6	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R7	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R8	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R9	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R10	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R11	000122	1k2 5% ¼W CARBON	MULLARD	CR25	—
R12	000332	3k3 5% ¼W CARBON	MULLARD	CR25	1
R13	000471	470R 5% ¼W CARBON	MULLARD	CR25	1
R14	000102	1k 5% ¼W CARBON	MULLARD	CR25	13
R15	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R16	000220	22R 5% ¼W CARBON	MULLARD	CR25	6
R17	000220	22R 5% ¼W CARBON	MULLARD	CR25	—
R18	000220	22R 5% ¼W CARBON	MULLARD	CR25	—
R19	000220	22R 5% ¼W CARBON	MULLARD	CR25	—
R20	000220	22R 5% ¼W CARBON	MULLARD	CR25	—
R21	000220	22R 5% ¼W CARBON	MULLARD	CR25	—
R22	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R23	000390	39R 5% ¼W CARBON	MULLARD	CR25	3

NOTES

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1065

FRONT PCB. ASSY.

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R24	000390	39R 5% ¼W CARBON	MULLARD	CR25	—
R25	000390	39R 5% ¼W CARBON	MULLARD	CR25	—
R26	000104	100k 5% ¼W CARBON	MULLARD	CR25	1
R27	000103	10k 5% ¼W CARBON	MULLARD	CR25	1
R28	000334	330k 5% ¼W CARBON	MULLARD	CR25	10
R29	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R30	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R31	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R32	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R33	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R34	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R35	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R36	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R37	000334	330k 5% ¼W CARBON	MULLARD	CR25	—
R38	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R39	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R40	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R41	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R42	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R43	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R44	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R45	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R46	000102	1k 5% ¼W CARBON	MULLARD	CR25	—

NOTES.

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1300

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R47	000272	2k7 5% ¼W CARBON	MULLARD	CR25	4
R48	000222	2k2 5% ¼W CARBON	MULLARD	CR25	1
R49	000182	1k8 5% ¼W CARBON	MULLARD	CR25	1
R50	000272	2k7 5% ¼W CARBON	MULLARD	CR25	–
R51	000272	2k7 5% ¼W CARBON	MULLARD	CR25	–
R52	000202	2k 5% ¼W CARBON	MULLARD	CR25	1
R53	000472	4k7 5% ¼W CARBON	MULLARD	CR25	1
R54	000272	2k7 5% ¼W CARBON	MULLARD	CR25	–
R55	000102	1K 5% ¼W CARBON	MULLARD	CR25	–
AN1	090050	3k3 x7 2% NETWORK	BECKMAN	764-1-R3k3	1
AN2	090078	470R x7 2% NETWORK	BECKMAN	764-1-R470	1
AN3	090017	100k x7 2% NETWORK	BECKMAN	764-1-R100K	2
AN4	090017	100k x7 2% NETWORK	BECKMAN	764-1-R100K	–
C1	104023	2n2F 20% 1kv CER DISC	ITT	HD16K102M2MS-SSIK00SC	1
C2	150016	1µF 20% 35v DIP. TANT	UNION CARBIDE	K1R0E35	2
C3	150016	1µF 20% 35v DIP. TANT	UNION CARBIDE	K1R0E35	–
C4	150002	10µF 20% 16V DIP. TANT	UNION CARBIDE	K10E16	1
C5	180006	47µF 25V AL. ELECT	MULLARD	016-16479	1
C6	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	8
C7	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–
C8	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–
C9	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–

NOTES

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APPROVED

DATE

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TITLE 1065 FRONT PCB. ASSY.

DRAWING NUMBER 400417 SHEET 4 OF 9

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C10	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–
C11	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–
C12	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–
C13	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100K	–
C14	180029	1µF 250v AL. ELECT.	ITT	EN12.12 1/250	1
D1	200006	1A 600v GP. Si DIODE	FAIRCHILD	IN4005	2
D2	200006	1A 600v GP. Si. DIODE	FAIRCHILD	IN4005	–
D3	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	11
D4	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D5	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D6	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D7	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D8	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D9	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D10	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D11	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D12	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D13	200001	75mA 75v GP. Si DIODE	FAIRCHILD	IN4148	–
D14	213005	75V ½W ZENER	MOTOROLA	BZX79C75	1

NOTES

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q1	240014	Si. NPN. TRANSISTOR	NATIONAL	BC 337 / TO18	3
Q2	240014	Si. NPN. TRANSISTOR	NATIONAL	BC 337 / TO18	–
Q3	240014	Si. NPN. TRANSISTOR	NATIONAL	BC 337 / TO18	–
Q4	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	11
Q5	250008	Si PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q6	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q7	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q8	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q9	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q10	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q11	250008	Si. PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q12	250008	Si PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q13	250008	Si PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q14	250008	Si PNP. TRANSISTOR	NATIONAL	BC214C / TO18	–
Q15	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	10
Q16	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q17	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q18	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q19	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q20	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	8

NOTES

SEE SHEET 2 FOR LATEST ISSUE

DATE		datron ELECTRONICS LTD	
DRAWN		TITLE	1065 FRONT PCB. ASSY.
CHECKED		DRAWING NUMBER	400417
APPROVED		SHEET	6 OF 9
DATE			

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q21	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
Q22	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
Q23	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
Q24	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q25	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q26	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q27	250009	Si. PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q28	250009	Si PNP. TRANSISTOR	NATIONAL	2N5401 / TO18	–
Q29	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
Q30	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
Q31	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
Q32	240009	Si. NPN. TRANSISTOR	NATIONAL	MPSL01 / TO18	–
M1	280084	PROG. KEYBOARD/DISP. INTERFACE	INTEL	P8279	1
M2	270048	QUAD 2 I/P NAND LS	NATIONAL	DM74LS00N	1
M3	280043	4 BIT LATCH/4-16 LINE DECODER	MOTOROLA	MC14515BCP	1
M4	280085	QUAD 2-INPUT 'AND' GATE	MOTOROLA	MC14081BCP	1

NOTES

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DATE		datron ELECTRONICS LTD	
DRAWN		TITLE	1065 FRONT PCB. ASSY.
CHECKED		DRAWING NUMBER	400417
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DATE			

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ECO												
DATE												
CHKD												

J.W. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
S1	700061	KEYBOARD SWITCH. RED LED	SCHADOW	SRL - RED LED	18
S2	700061	" " " "	"	"	—
S3	700061	" " " "	"	"	—
S4	700061	" " " "	"	"	—
S5	700061	" " " "	"	"	—
S6	700061	" " " "	"	"	—
S7	700061	" " " "	"	"	—
S8	700061	" " " "	"	"	—
S9	700061	" " " "	"	"	—
S10	700061	" " " "	"	"	—
S11	700061	" " " "	"	"	—
S12	700061	" " " "	"	"	—
S13	700061	" " " "	"	"	—
S14	700061	" " " "	"	"	—
S15	700061	" " " "	"	"	—
S16	700061	" " " "	"	"	—
S17	700061	" " " "	"	"	—
S18	700061	" " " "	"	"	—
	410149-	PCB			1
	450295-	TERMINAL PLATE			1
	605060	14 WAY DIL SOCKET	AUGAT	314-AG39D	2

NOTES

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ECO												
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datron

1065
FRONT PCB. ASSY.

DRAWING NUMBER 400417 SHEET 8 OF 9

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
	605097	24 PIN DIL SOCKET	CAMBION	703-4324-01-06-00	1
	605098	40 PIN DIL SOCKET	CAMBION	703-4340-01-06-00	1
	630024	STD. STEATITE INSUL. BEAD	PARK ROYAL PORCELAIN CO.	TYPE Nº 2 (16SWG)	8
	630029	SCOTCHTAPE D/SIDED 1/4 x 1/32 THK	3M	TYPE 4032-1/4"	A/R
	800017	8½ DIGIT DISPLAY WITH LEGEND	DALE		1
	920015	LOW EMF. TERMINAL - BLK	CLIFF	TPI SPECIAL	1
	920041	LOW EMF. TERMINAL - RED	CLIFF	TPI SPECIAL	1
	920043	NOT LOW EMF TERMINAL - BRN	CLIFF	TPI	1
	920044	NOT LOW EMF TERMINAL - BLUE	CLIFF	TPI	1
	420080-1	WARNING LABEL			1

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TITLE 1065
FRONT PCB. ASSY

DRAWING NUMBER 400417 SHEET 9 OF 9

AW 3184

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
R1	000104	100k 5% ¼W CARBON	MULLARD	CR25	1
R2	066200	20R POT ⅜ SQ. VERT. CERM.	BECKMAN	72XW	1
R3	000221	220R 5% ¼W CARBON	MULLARD	CR25	1
R4	014300	430R 1% ⅛W 50ppm MF	HOLCO	H8C	1
R5	000102	1k 5% ¼W CARBON	MULLARD	CR25	2
R6	000184	180k 5% ¼W CARBON	MULLARD	CR25	1
R7	066501	500R POT ⅜ SQ. VERT. CERM.	BECKMAN	72XW	2
R8	012371	2k37 1% ⅛W 50ppm MF	HOLCO	H8C	2
R9	012430	243R 1% ⅛W 50ppm MF	HOLCO	H8C	2
R10	012371	2k37 1% ⅛W 50ppm MF	HOLCO	H8C	–
R11	012430	243R 1% ⅛W 50ppm MF	HOLCO	H8C	–
R12	066501	500R POT ⅜ SQ VERT. CERM.	BECKMAN	72XW	–
R13	000102	1k 5% ¼W CARBON	MULLARD	CR25	–
R14	000332	3k3 5% ¼W CARBON	MULLARD	CR25	3
R15	000183	18K 5% ¼W CARBON	MULLARD	CR25	1
R16	000222	2k2 5% ¼W CARBON	MULLARD	CR25	1
R17	000123	12k 5% ¼W CARBON	MULLARD	CR25	1
R18	000681	680R 5% ¼W CARBON	MULLARD	CR25	1
R19	000332	3k3 5% ¼W CARBON	MULLARD	CR25	–
R20	000332	3k3 5% ¼W CARBON	MULLARD	CR25	–
R21	000103	10k 5% ¼W CARBON	MULLARD	CR25	2
R22	000103	10k 5% ¼W CARBON	MULLARD	CR25	–
R23	000105	1M 5% ¼W CARBON	MULLARD	CR25	1

NOTES

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ISS	C	D	1
E.C.O.	–	–	RELEASED
DATE	15.9.80	27.11.80	18.12.80
CHK'D	–	AD	

15.9.80
D. King

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1065
REAR PCB ASSY.
DRAWING NUMBER 400418 SHEET 2 OF 7

SW 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
L1	370001	10μH 0·85Ω R.F. CHOKE	PLESSEY	58/10/0011/10	3
L2	370001	10μH 0·85Ω R.F. CHOKE	PLESSEY	58/10/0011/10	–
L3	370001	10μH 0·85Ω R.F. CHOKE	PLESSEY	58/10/0011/10	–
C1	110013	0·1μF 10% 250V POLYESTER	MULLARD	C280AE/P100K	2
C2		NOT USED			–
C3		NOT USED			–
C4		NOT USED			–
C5	101103	10nF 25% 250v CER DISC	ITT	CD10	4
C6	180026	10μF 350v AL. ELECT	ITT	EN12.12 10/350	1
C7	180004	4700μF 16V AL. ELECT.	WIMA	PRINTILYT 1	1
C8	101103	10nF 25% 250V CER. DISC.	ITT	CD10	–
C9	150003	47μF 20% 6V3 DIP. TANT.	UNION CARBIDE	K47E6V3	1
C10	150021	22μF 20% 25V DIP. TANT.	UNION CARBIDE	K22E25	2
C11	150021	22μF 20% 25V DIP. TANT.	UNION CARBIDE	K22E25	–
C12	101103	10nF 25% 250v CER. DISC.	ITT	CD10	–
C13	180025	1000μF 35V AL. ELECT.	WIMA	PRINTILYT 1	2
C14	101103	10nF 25% 250V. CER. DISC	ITT	CD10	–

NOTES.

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TITLE 1065
REAR PCB ASSY.
DRAWING NUMBER 400418 SHEET 3 OF 7

SW. 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy.
C15	180025	1000μF 35v AL. ELECT	WIMA	PRINTILYL	—
C16	102102	1nF 10% 500v CER DISC	ITT	CD10	1
C17	150022	2μ2F 20% 35v DIP TANT	UNION CARBIDE	K2R2E35	1
C18	110013	100nF 20% 250v POLYESTER	MULLARD	C280AE P100K	—
C19	150007	6μ8F 20% 16v DIP TANT	UNION CARBIDE	K6R8E16	1
C20	102101	100pF 10% 500v CER DISC	ITT	CD10	1
C21	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	2
C22	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
D1	200010	Si RECTIFIER 3A 100v	IR	30S1	2
D2	200010	Si RECTIFIER 3A 100v	IR	30S1	—
D3	210068	6V8 400mW ZENER	MULLARD	BZY88C6V8	1
D4	213004	180v ½W ZENER	MOTOROLA	1N5279B	1
D5	200001	75mA 75v GP Si DIODE	FAIRCHILD	1N4148	3
D6	200001	75mA 75v GP Si DIODE	FAIRCHILD	1N4148	—
D7	200001	75mA 75v GP Si DIODE	FAIRCHILD	1N4148	—
Q1	240018	Si NPN TRANSISTOR	MOTOROLA	MJE340	2
Q2	240018	Si NPN TRANSISTOR	MOTOROLA	MJE340	—
Q3	240001	Si NPN TRANSISTOR	NATIONAL	BC184/TO18	2
Q4	250008	Si PNP TRANSISTOR	NATIONAL	BC214C/TO18	1
Q5	240001	Si NPN TRANSISTOR	NATIONAL	BC184/TO18	—

NOTES

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TITLE 1065 REAR PCB ASSY

DRAWING NUMBER 400418

SHEET 4 OF 7

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy.
M1	260005	5v 1A REGULATOR	MOTOROLA	MC7805CP	1
M2	260037	317 ADJUSTABLE REGULATOR	NATIONAL	LM317T	1
M3	260038	337 ADJUST. NEG. REGULATOR	NATIONAL	LM337T	1
M4	280011	DUAL D FLIP-FLOP	MOTOROLA	MC4013BCP	1
W1	209014	1A S 400v BRIDGE RECT.	MICRO ELECTRONICS	W004	1
W2	209004	100v. 1A. BRIDGE RECT.	G.I.	W01	1
J1		NOT USED			—
J2	NOT FITTED AT	THIS STAGE OF ASSY.			—
J3	NOT FITTED AT	THIS STAGE OF ASSY.			—
J4	NOT FITTED AT	THIS STAGE OF ASSY.			—
J5		NOT USED			—
J6	NOT FITTED AT	THIS STAGE OF ASSY.			—
J7	NOT FITTED AT	THIS STAGE OF ASSY			—
J8	NOT FITTED AT	THIS STAGE OF ASSY.			—
J9		NOT USED			—
J10		NOT USED			—
J11		NOT USED			—
J12		NOT USED			—
J13		NOT USED			—
J14	NOT FITTED AT	THIS STAGE OF ASSY.			—

NOTES

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ECO													
DATE													
CHKD													

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TITLE 1065 REAR PCB ASSY.

DRAWING NUMBER 400418

SHEET 5 OF 7

JW 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
J15	NOT FITTED AT	THIS STAGE OF ASSY.			—
J16		NOT USED			—
J17	NOT FITTED AT	THIS STAGE OF ASSY.			—
RL1 (1)	330003	RELAY 2P2W CROSSBAR	P+B	R10-E1-L2-Q5·8k (25207)	1
RL2 (11)	330001	RELAY 4P2W CROSSBAR	P+B	R10-E1-L4-Q2·5k	1
	540002	22SWG BTC WIRE			A/R
	590001	SLEEVE. MAXCABLE ø 3·0	HELLERMANN ELECTRIC	HIS x 20mm BLACK HELSYN	10
	590004	SLEEVE. PTFE	HELLERMANN ELECTRIC	FE10	A/R
	605060	14 WAY DIL SOCKET	ASTRALUX or JERMYN	ICL143-S5T	1
	611016	SCREW M3x8 STEEL POZIPAN	ZN. PLATED GKN		6
	611037	SCREW M3x8 NYLON HEX. HD.			9
	613005	WASHER M3 INT. SHAKEPROOF	STEEL GKN		8
	613017	WASHER M3 FLAT NYLON	NYLON & ALLOYS		9
	615001	NUT 8BA FULL HEX. STEEL	ZN. PLATED		2
	615002	NUT M3 FULL HEX. STEEL	ZN. PLATED		4
	615008	NUT M3 FULL HEX. NYLON			3

NOTES (1) ALTERNATIVE RELAY 330015 (OMRON) — USE M2·3 FULL HEX. NUT. 615014 (CHALLENGE IND. FASTENERS) 2 OFF.
(11) ALTERNATIVE RELAY 330016 (OMRON)

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DATE 15.9.80
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TITLE 1065 REAR PCB ASSY.
DRAWING NUMBER 400418
SHEET 6 OF 7

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	618007	MELINEX WASHER	JERMYN	J26-5001	3
					2
	410154-3	PCB.			1
	450180-1	HEATSINK 5v	ADVANCE		1
	450183-1	HEATSINK 15V	ADVANCE		3
	450241-1	RELAY BRACKET	ADVANCE		1
	420080-1	WARNING LABEL			2
	900004	SILICONE RUBBER COMPOUND RS.			A/R

NOTES

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ISS														
ECO														
DATE														
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TITLE 1065 REAR PCB ASSY.
DRAWING NUMBER 400418
SHEET 7 - 7

J.W 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
J2	572150/C	16 WAY RIBBON CABLE ASSY	DATRON		1
J3	604035	4CCT. RIGHT ANGLED WAFER. GOLD	MOLEX.	22-12-2041.	5
J4	604035	" " " "	"	"	—
J6	604035.	" " " "	"	"	—
	410092-5A	P.C.B.			1
	540002	22SWG TIN CU. WIRE			A/R
J1 & J5	604036	STRIP OF 10 AMP PINS	AMP	163740-8	4
	630023	SCOTCHFLEX ADHESIVE CLIP	3M	CLIP 706	1
	630099	25mm MASKING TAPE	3M	SCOTCH N.230	A/R.
R1	000473	47K 5% ¼W CARBON	MULLARD	CR25	2
R2	000473	47K " " "	"	"	—
D1	200002	Si RECTIFIER 1A 50V	FAIRCHILD	IN4001	2
D2	200002	" " " "	"	"	—

NOTES. CIRCUIT DIAGRAM . 430419
CHECK PROC. . 460419
CHECK WIT. . 470419
SEE SHEET 2 FOR LATEST ISSUE

	A	1	2
	—	RELEASED	12.1.7
	18.12.80	18.8.81	
		MD	

DATE 9.10.80
DRAWN IL
CHECKED MJD
APPROVED
DATE

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TITLE 1065 CENTRE P.C.B. ASSY
DRAWING NUMBER 400419
SHEET 2 OF 2

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
J1	604036	CON PIN STRIP OF 10 HORIZ.	AMP	163740-8	2
J2	604035	4CCT RIGHT ANGLE WAFER	MOLEX	22-12-2041	7
J3	604035	" " " "	"	"	—
J4	604035	" " " "	"	"	—
J5		NOT USED			—
J6		NOT USED			—
J7	604036	CON. PIN STRIP OF 10 HORIZ	AMP	163740-8	—
	410150-	PCB			1
	540002	22 SWG BTC WIRE			A/R

NOTES

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ISS	A	1
ECO	—	RELEASED
DATE	—	18.12.80
CHKD		

18.9.80
DRAWN IL
CHECKED D. King
APPROVED
DATE

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1065
L.H. PCB. ASSY.
DRAWING NUMBER 400420
SHEET 2 OF 2

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R1	000104	100K 5% ¼W CARBON	MULLARD	CR25	13
R2	000101	100R " " "	"	"	4
R3	000101	100R " " "	"	"	–
R4	000105	1M 10% " "	"	"	1
R5	000823	8k2 " " "	MULLARD	CR25	3
R6	011852	13KΩ 1% 50ppm MF	HOLCO	HBC	2
R7	011852	13KΩ " " "	"	"	–
R8	000101	100R 5% ¼W CARBON	MULLARD	CR25	–
R9		NOT USED			–
R10	000101	100R 5% ¼W CARBON	"	"	–
R11		FSV		CR25	–
R12	000472	4k7 " " "	"	"	11
R13	000104	100k " " "	"	"	–
R14	000472	4k7 " " "	"	"	–
R15		FSV		CR25	–
R16	050038	6K34 1% 15ppm MF	ACI	EE-0-100-C4	2
R17	050037	4K75 1% 15ppm MF	ACI	EE-0-100-C4	2
R18		PART OF KIT WITH D59			–
R19		PART OF KIT WITH D60			–
R20	063203	20K POT CERMET -	BECKMAN	72P	1
R21	000104	100K 5% ¼W CARBON	MULLARD	CR25	–
R22	000102	1K " "	"	"	4
R23	063205	2M POT CERMET	BECKMAN	72P	1

NOTES CIRCUIT DIAGRAM = 450421
CHECK PROCEDURE = 460421
CHECK LIST = 470421
SEE SHEET 2 FOR LATEST ISSUE

ISS	B	1	2	3	4	5	6
ECO		–	1151.1168	1114.1182.1184.1188.1191.1193.1192.	181	217	234 1248
DATE		1/8/80	23/9/80	5.1.80	5.1.80	18-8-81	30 10 81
CHKD		MD	MD	MD	MD	MD	MD

DATE 1.7.80
DRAWN
CHECKED P. KING
APPROVED
DATE

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TITLE 1065 ANALOGUE PCB ASSEMBLY
DRAWING NUMBER 400421 SHEET 2 OF 24

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R24	000824	820K 5% ¼W CARBON	MULLARD	CR25	3
R25	000122	1K2 5% ¼W CARBON	MULLARD	CR25	1
R26	000225	2M2 10% ¼W CARBON	"	"	1
R27	000824	820K 5% ¼W CARBON	"	"	–
R28	000222	2K2 5% ¼W CARBON	"	"	6
R29	000100	10R " " "	"	"	8
R30	000100	10R " " "	"	"	–
R31	000473	47K " " "	"	"	3
R32	000393	39K " " "	"	"	1
R33	000473	47K " " "	"	"	–
R34	000102	1K " " "	"	"	–
R35	000104	100k " " "	"	"	–
R36	000104	100k " " "	"	"	–
R37	000562	5K6 5% ¼W CARBON	MULLARD	CR25	3
R38	050034	825R 1% 15ppm MF	ACI		2
R39	050053	64R2 1% 1/10W 15ppm MF	ACI	EE-0.10-64R2-F-C4	2
R40	050053	64R2 1% 1/10W 15ppm MF	ACI	EE-0.10-64R2-F-C4	–
R41		FSV			
R42	050031	196R 1% 15ppm MF	ACI	EE 0·100 C4	2
R43	019768	97R6 1% 50ppm MF	HOLCO	HBC	2
R44		NOT USED			–
R45		NOT USED			–
R46	000182	1K8 5% ¼W CARBON	MULLARD	CR25	1

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
R47	000100	10R 5% 1/4W CARBON	MULLARD	CR25	–
R48	000103	10K " " "	"	"	11
R49	000103	10K " " "	"	"	–
R50	000103	10K " " "	"	"	–
R51	000100	10R " " "	"	"	–
R52	000334	330k 5% 1/4W CARBON	MULLARD	CR25	4
R53	000334	330k " " "	"	"	–
R54	000334	330k " " "	"	"	–
R55	000334	330k " " "	"	"	–
R56	000104	100K 5% 1/4W CARBON	MULLARD	CR25	–
R57	000221	220R " " "		"	3
R58	000821	820R " "			1
R59	000563	56K " "			6
R60	000222	2K2 " "			–
R61	000105	1MO 10% 1/4W CARBON			–
R62	000105	1MO " " "			–
R63	000221	220R 5% 1/4W CARBON			–
R64		NOT USED			–
R65	000102	1K 5% 1/4W CARBON		"	–
R66	000183	18K " " "			1
R67	000562	5K6 " " "			–
R68	018060	806R 1% 50ppm MF	HOLCO	H8	2
R69	000114	110K 5% 1/4W CARBON	MULLARD	CR25	12

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
R70	018060	806R 1% 50 ppm MF	HOLCO	H8	–
R71	070115	12KΩ 1% 10ppm WW	MANN	MX125	2
R72	000472	4k7 5% 1/4W CARBON	MULLARD	CR25	–
R73	000103	10K 5% 1/4W CARBON	MULLARD	CR25	–
R74	000275	2M7 "			1
R75	000565	5M6 "			1
R76	000106	10M 10% 1/4W CARBON			2
R77	000226	22M "	ALLEN BRADLEY	CB2261	1
R78	000473	47K 5% 1/4W CARBON	MULLARD	CR25	–
R79	000392	3K9 "			2
R80	000104	100K "			–
R81	000472	4K7 "			–
R82	000472	4K7			–
R83	000472	4K7			–
R84		NOT USED			–
R85		NOT USED			–
R86	000472	4K7 5% 1/4W CARBON	MULLARD	CR25	–
R87	000114	110K " "	"	"	–
R88		FSV			–
R89	050031	196R 1% ppm MF	ACI	EE 0·100-C4	–
R90	019768	97R6 1% 50ppm MF	HOLCO	H8C	–
R91		NOT USED			–
R92		NOT USED			–

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R93	000124	120K 5% ¼W CARBON	MULLARD	CR25	2
R94	000102	1K " " "	"	"	–
R95	000106	10M 10% " "	"	"	–
R96	011473	147K 1% 50ppm MF	HOLCO	H8	1
R97		NOT USED			–
R98		NOT USED			–
R99	000472	4K7 5% ¼W CARBON	MULLARD	CR25	–
R100	000472	4K7 " " "	"	"	–
R101	000100	10R 5% ¼W CARBON	MULLARD	CR25	–
R102	000100	10R " " "	"	"	–
R103	000271	270R " " "	"	"	4
R104	000151	150R " " "	"	"	1
R105	000271	270R " " "	"	"	–
R106	000222	2k2 " " "	"	"	–
R107	000222	2k2 " " "	"	"	–
R108		NOT USED			–
R109	090068	21k622 ATTEN SET	MANN		1SET
R110	090068	9k ATTEN SET	"		–
R111	090068	1k "	"		–
R112	005682	6K8 5% ¼W CARBON	MULLARD	CR25	1
R113	000105	1MO 10% ¼W CARBON	"	"	–
R114	042214	2M211% 100ppm CERMET FILM	ALLEN BRADLEY	TYPE CC	1
R115	041004	1M 1% 100ppm CERMET FILM	"	"	1

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R116	000105	1M 5% ¼W CARBON	MULLARD	CR25	–
R117	000105	1M " " "	"	"	–
R118	000105	1M " " "	"	"	–
R119	008012	27K 2W CARBON FILM	PIHER	"	2
R120	008012	27K " " "	"	"	–
R121	008011	22K " " "	"	"	2
R122	008011	22K " " "	"	"	–
R123	000304	300k 5% ¼W CARBON	MULLARD	CR25	1
R124		NOT USED			–
R125		NOT USED			–
R126	014751	4k75 1% 50 ppm MF	HOLCO	H8	1
R127	042215	22M1 1% 100 ppm CF	ALLEN BRADLEY	CC	3
R128	042215	22M1 1% 100 ppm CF	ALLEN-BRADLEY	CC	–
R129	042215	22M1 " 100 ppm	"	"	–
R130	000362	3K6 5% ¼W CARBON	MULLARD	CR25	2
R131	000362	3K6 " " "	"	"	–
R132	000105	1M " " "	"	"	–
R133	000105	1M " " "	"	"	–
R134		NOT USED			–
R135	011503	150k 1% 50ppm MF	HOLCO	H8	1
R136		NOT USED			–
R137		NOT USED			–
R138		NOT USED			–

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
R139		NOT USED			–
R140	090049	18M MATCHED PAIR	HOLCO		1 PAIR
R141	090049	18M " "	"		
R142	000272	2K7 5% ¼W CARBON	MULLARD	CR25	1
R143		NOT USED			–
R144	000100	10R 5% ¼W CARBON	MULLARD	CR25	–
R145	000100	10R " " "			–
R146	000222	2K2 " " "			
R147	000752	7K5 " " "			1
R148		NOT USED			–
R149		NOT USED			–
R150	063204	200K POT CERMET	BECKMAN	72P	1
R151		NOT USED			–
R152		FSV	HOLCO	H8C	–
R153	011822	18K2 1% ⅛W MF	HOLCO	H8	1
R154	000103	10K 5% ¼W CARBON	MULLARD	CR25	–
R155	000221	220R " " "			–
R156		NOT USED			–
R157	000103	10K 5% ¼W CARBON	MULLARD	CR25	–
R158	000332	3K3 " " "	"		1
R159	063103	10K POT CERMET	BECKMAN	72P	1
R160	063504	500K " "	"	"	1
R161	000104	100K 5% ¼W CARBON	MULLARD	CR25	–

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
R162	000392	3K9 5% ¼W CARBON	MULLARD	CR25	–
R163	000107	100M 10% ¼W CARBON	ALLEN BRADLEY	CB1071	2
R164	000104	100k 5% ¼W CARBON	MULLARD	CR25	–
R165	000104	100k			–
R166	000563	56K 5%		"	–
R167	000562	5K6			–
R168	000563	56K			–
R169	000563	56K			–
R170	000564	560K			2
R171	000564	560K			–
R172	000335	3M3 10% ¼W CARBON	MULLARD	CR25	1
R173	000680	68R 5%			2
R174	000152	1K5			2
R175	000822	8K2			–
R176	000680	68R			–
R177	000152	1K5			–
R178	000822	8K2			–
R179	440067	PART OF KIT	DATRON.		1
R180	440067	" " "	"		–
R181	440067	" " "	"		–
R182	000472	4K7 5% ¼W CARBON	MULLARD	CR25	–
R183	000472	4K7 5%	"	"	–
R184	000270	27R			2

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J.W. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R185	000270	27R 5% 1/4W CARBON	MULLARD	CR25	–
R186	000104	100K " " "			–
R187	000222	2K2 " " "			–
R188	000103	10K " " "			–
R189	000103	10K " " "			–
R190	000561	560R " " "			2
R191	000561	560R " " "			–
R192	000155	1M5 " " "			1
R193	000104	100K " " "			–
R194	011213	121K 1% 1/8W MF	HOLCO	H8	1
R195	015112	51K1 " " "			1
R196		NOT USED			–
R197		NOT USED			–
R198		NOT USED			–
R199	008007	10R 5% 0·2W CARBON	MULLARD	CR16	2
R200	008007	10R			–
R201	000824	820K 5% 1/4W CARBON	MULLARD	CR25	–
R202	000103	10K			–
R203	000104	100K			–
R204	000105	1M			–
R205	000105	1M			–
R206	000563	56K			–
R207	000103	10K			–

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J.W. 1364

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
R208	000333	33K 5% 1/4W CARBON	MULLARD	CR25	1
R209	000563	56K " " "			–
R210	000103	10K " " "			–
R211	050038	6K34 1% 15 ppm MF	ACI	EE-0·100 C4	–
R212	050034	825R 1% 15ppm MF	ACI	EE-0·100 C4	–
R213	050037	4K75 1% 15ppm MF	ACI	EE-0·100 C4	–
R214	070115	12K0 1% 10ppm WW	MANN	MX125	–
R215	000271	270R 5% 1/4W CARBON	MULLARD	CR25	–
R216	000271	270R 5% 1/4W CARBON	MULLARD	CR25	–
R217		NOT USED			–
R218		NOT USED			–
R219	000224	220K 5% 1/4W CARBON	MULLARD	CR25	3
R220	000124	120K " " "	"	"	–
R221	000224	220K " " "	"	"	–
R222	000224	220K " " "	"	"	–
R223		NOT USED			–
R224		NOT USED			–
R225		NOT USED			–
R226		NOT USED			–
R227	000471	470R 5% 1/4W CARBON	MULLARD	CR25.	1
R228	043924	3M92 1% 100ppm CF	ALLEN BRADLEY	CC	1
R229	000107	100M 10% 1/4W CARBON	ALLEN BRADLEY	CB1071	–
R230	012003	200k 1% 1/8W MF	HOLCO	H8	1

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
R231		NOT USED			—
R232		NOT USED			—
R233		NOT USED			—
R234		NOT USED			—
R235		NOT USED			—
R236	016192	61k9 1% 1/8W 50ppm MF	HOLCO	H8C	2
R237	016192	61k9 1% 1/8W 50ppm MF	HOLCO	H8C	—
AN1	090050	3K3 SIP NETWORK	BECKMAN	764-1-R3·3K	1
AN2	090042	R-2R LADDER NETWORK	ERIE		1
AN3	090069	9M9/100K NETWORK	CADDOCK		1
C1	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE 25	12
C2	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE 25	—
C3	104017	0·5pF 500V CER DISC	ERIE	831	1

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
C4	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE25	—
C5	102471	470pF 500V CER DISC	ERIE	801	3
C6	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE25	—
C7	150020	10µF " " "			—
C8	102150	15pF 500V CER DISC	ERIE	801	1
C9	140016	0·47µF 400V POLYPROP	RIFA	PHE 412 HFK	1
C10	110015	0·015µF63V POLYESTER	WIMA	FKS2	1
C11	120026	680pF 20% 100V POLYCARB	WIMA	FKC2 MIN	1
C12	120004	680nF 10% 63V POLYCARB	ASHCROFT	A2B6811B	1
C13	102101	100pF 500V CER DISC	ERIE	801	3
C14	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE25	—
C15	150020	10µF " " "			—
C16	102101	100pF 500V CER DISC	ERIE	801	—
C17	102100	10pF 500V CER DISC	ERIE	801	1
C18	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE25	—
C19	150020	10µF " " "			—
C20	102470	47pF 500V CER DISC	ERIE	801	5
C21	102470	47pF 500V CER DISC	ERIE	801	—
C22	102101	100pF 500V CER DISC			—
C23	101103	0·01µF 250V CER DISC			5
C24	101103	0·01µF 250V CER DISC			—
C25	150020	10µF 20% 25V DIP TANT	UNION CARBIDE	KIOE25	—
C26	102471	470pF 500V CER DISC	ERIE	801	—

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
C27		NOT USED			–
C28	102470	47pF 500V " "	ERIE	801	–
C29	102470	47pF 500V " "	"	"	–
C30		NOT USED			–
C31	130073	1nF 5% 160V POLYSTYRENE	SUFLEX	HSC1000/5-10/160	1
C32	101103	0·01μF 250V CER DISC	ERIE	801	–
C33	110013	0·1μF 10% 250V POLYESTER	MULLARD	C280AE/P100K	2
C34	101103	0·01μF 250V CER DISC	ERIE	801	–
C35	120016	2n2F 20% 100V POLYCARB	WIMA	FKC 2MIN.	1
C36	102471	470pF 500V CER DISC			–
C37	110013	0·1μF 10% 250V POLYESTER	MULLARD	C280AE/P100K	–
C38	102470	47pF 500V CER DISC	ERIE	801	–
C39	440067	PART OF KIT	DATRON.		–
C40	440067	" " "	"		–
C41	440067	" " "	"		–
C42		NOT USED			–
C43	150020	10μF 20% 25V DIP TANT	UNION CARBIDE	K10E25	–
C44	150020	10μF			–
C45	180006	47μF 25V AL.ELECT	MULLARD	016-16479	2
C46	180006	47μF 25V			–
C47	180022	33μF 40V		016-17339	2
C48	180022	33μF 40V			–
C49	180024	10μF 63V AL.ELECT	MULLARD	016-18109	2

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
C50	180024	10μF 63V AL.ELECT	MULLARD	016-18109	–
C51	101103	0·01μF 250V CER DISC	ERIE	801	–
C52	110017	0·022μF 10% 250V POLYESTER	MULLARD	C280AE/P22K	1
C53	102332	3n3F 500V CER DISC	ERIE	801	2
C54	102332	3n3F			–
C55	440067	PART OF KIT.	DATRON.		–
C56		NOT USED			–
C57	130013	18pF ±1pF 160V POLYSTYRENE	SUFLEX	HS	1
C58	110027	3300pF 20% 100V POLYESTER	WIMA	FKS2-MIN	1
C59		NOT USED			–
C60	102222	2n2F 500V CER DISC	ERIE	801	1
C61	102221	220pF 500V CER DISC	ERIE	801	1
D1	200008	SI LOW LEAKAGE	FAIRCHILD	IN458A	23
D2	210056	C5V6 400mW ZENER	MULLARD	BZY88C	2
D3	200008	SI LOW LEAKAGE	FAIRCHILD	IN458A	–
D4	210056	C5V6 400mW ZENER	MULLARD	BZY88C	–
D5	200001	SI GEN. PURPOSE	FAIRCHILD	IN4148	17
D6	200008	SI LOW LEAKAGE	FAIRCHILD	IN458A	–

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
D7	200008	SI LOW LEAKAGE	FAIRCHILD	1N458A	–
D8	210082	C6V2 400mW ZENER	MULLARD	BZY88C	1
D9	200008	SI LOW LEAKAGE	FAIRCHILD	1N458A	–
D10	200008	"	"		–
D11	200008	"	"		–
D12	200001	SIL. GEN. PURPOSE	"	1N4148	–
D13	200001	SIL. GEN. PURPOSE	"	1N4148	–
D14	200001	SIL. GEN. PURPOSE	"	1N4148	–
D15	200001	SIL. GEN. PURPOSE	"	1N4148	–
D16	200008	SI LOW LEAKAGE	FAIRCHILD	1N458A	–
D17	200008				–
D18	210068	C6V8 400mW ZENER	MULLARD	BZY88C	2
D19	210068				–
D20		NOT USED			–
D21	200001	SI GEN PURPOSE	FAIRCHILD	1N4148	–
D22	210220	C22V 400mW ZENER	MULLARD	BZY88C	2
D23	210220				–
D24	200001	SI GEN PURPOSE	FAIRCHILD	1N4148	–
D25	200008	SI LOW LEAKAGE	FAIRCHILD	1N458A	–
D26	200008				–
D27	200008				–
D28	200008				–
D29	200008				–

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
D30	200008	SI LOW LEAKAGE	FAIRCHILD	1N458A	–
D31	200001	SI GEN PURPOSE	FAIRCHILD	1N4148	–
D32	200001	" " "	"		–
D33	200001	" " "	"		–
D34	200001	"	"		–
D35	210047	C4V7 400mW ZENER	MULLARD	BZY88C	1
D36	200008	SI LOW LEAKAGE	FAIRCHILD	1N458A	–
D37	200008				–
D38	200008				–
D39		NOT USED			–
D40	200001	SI GEN PURPOSE	FAIRCHILD	1N4148	–
D41	200001	SI GEN PURPOSE	FAIRCHILD	1N4148	–
D42	200001	" " "	"		–
D43	200002	SI RECTIFIER 1A 50V	MOTOROLA	1N4001	4
D44	200002	" " "	"		–
D45	200002	" " "	"		–
D46	200002	" " "	"		–
D47	210150	C15V 400mW ZENER	MULLARD	BZY88C	1
D48	200001	SI GEN PURPOSE	FAIRCHILD	1N4148	–
D49	210200	C20V 400mW ZENER	MULLARD	BZY88C	2
D50	210100	C10V 400mW ZENER	MULLARD	BZY88C	2
D51	210100	" " "	"	"	–
D52	210200	C20V 400mW ZENER	MULLARD	BZY88C	–

NOTES.

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DRAWING NUMBER 400421
SHEET 17 OF 24

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
D53	200008	SI LOW LEAKAGE	FAIRCHILD	IN458A	
D54	200008	" "	"	"	–
D55		NOT USED			–
D56	200001	Si. Gen. PURPOSE	FAIRCHILD	IN4148	–
D57		NOT USED			–
D58		NOT USED			–
D59	219011	214010 SELECTED WITH R18			2
D60	219011	214010 SELECTED WITH R19			–
D61	210033	C3V3 400 mW ZENER	MULLARD	BZY88C3V3	2
D62	210033	" " "	"	"	–
D63	200001	SI GEN PURPOSE	FAIRCHILD	IN4148	–
D64	210120	12V 400mW ZENER	MULLARD	BZY88C12	2
D65	210120	12V 400mW ZENER	MULLARD	BZY88C12	–
D66	200008	SI LOW LEAKAGE	FAIRCHILD	IN458A	–
D67	200008	" " "	"	"	–
D68	200008	" " "	"	"	–

NOTES

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SHEET 18 OF 24

JW 1164

DESIGNATOR	DATRON PART No				
Q1	230001	N CHAN CURRENT LIM	SILICONIX	E506	2
Q2	250008	Si PNP TRANSISTOR	NATIONAL	BC214C/TO18	2
Q3	250008	Si PNP TRANSISTOR	NATIONAL	BC214C/TO18	–
Q4	230001	N CHAN CURRENT LIM	SILICONIX	E506	
Q5	230027	LOW LEAKAGE N-FET	TELEDYNE	U5114	7
Q6	230027	" " "	"	"	–
Q7	230027	" " "	"	"	–
Q8	230027	" " "	"	"	–
Q9	230027	" " "	"	"	–
Q10	230027	" " "	"	"	–
Q11	230027	" " "	"	"	
Q12	240017	LOW DRIFT DUAL NPN TRANS	NATIONAL	LM394	1
Q13	230002	N-CHAN J FET	TELEDYNE	U1554E	6
Q14	230002	" "	"	"	–
Q15	230002	" "	"	"	–
Q16	230002	" "	"	"	–
Q17		NOT USED			
Q18	230002	N-CHAN J-FET	TELEDYNE	U1554E	–
Q19	230002	" "	"	"	–
Q20	240006	SI NPN	FAIRCHILD	2N3904	5
Q21	240006	"	"	"	–
Q22	240006	"	"	"	–
Q23	240006	"	"	"	–

NOTES

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Q24	240014	Si NPN	FAIRCHILD	BC337	2
Q25	250011	Si PNP	"	BC327	2
Q26	250011	" "	"	"	–
Q27	250001	Si PNP	"	BC214	1
Q28	240014	Si NPN	"	BC337	–
Q29	240001	Si NPN	"	BC184	3
Q30	240006	Si NPN	"	2N3904	–
Q31	250004	Si PNP	"	2N3906	1
Q32	240001	Si NPN	"	BC184	–
Q33	240001	Si NPN	"	BC184	–
Q34		NOT USED			–
Q35	230031	N-CHAN DUAL JFET	TELEDYNE	SU2656M	2
Q36	230031	N-CHAN DUAL JFET	TELEDYNE	SU2656M	–

NOTES

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1065 ANALOGUE P.C.B ASSEMBLY

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W 1164

DESIGNATOR		DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
M1	*	220030	HI SPEED OPTO SELECTED	DATRON	HP4351 (RED)	2
M2		220017	DUAL OPTO ISOLATOR	FAIRCHILD	FCD880	6
M3			NOT USED			–
M4		220029	HI SPEED OPTO SELECTED	DATRON	HP4351 (WHITE)	2
M5		220029			" "	–
M6	*	220030			HP4351 (RED)	–
M7		220023	50 CTR DUAL OPTO ISOLATOR	FAIRCHILD	FCD880/50 CTR	1
M8		220017	DUAL OPTO ISOLATOR	"	FCD880	–
M9		220017			"	–
M10		220017			"	
M11		220017			"	
M12		280075	DUAL 4 I/P NAND	MOTOROLA	MC14012 BCP	1
M13		280015	QUAD LATCH	MOTOROLA	MC14076 BCP	4
M14		280015		"	"	–
M15		260029	VOLTAGE COMPARATOR	NATIONAL	LM311HC	1
M16		280082	HEX INVERTER	FAIRCHILD	F40014 BPC	1
M17		280079	QUAD 2 I/P OR GATE	MOTOROLA	MC14071 BCP	1
M18		280008	QUAD 2 I/P NAND GATE	"	MC14011 BCP	3
M19		280008	QUAD 2 I/P NAND GATE	"	"	–
M20		280015	QUAD LATCH	MOTOROLA	MC14076 BCP	–
M21		280015	" "	"	"	–
M22		260035	5534 OP AMP	SIGNETICS	NE5534T	1
M23			NOT USED			–

NOTES. * ALTERNATIVE 220018 (HP4351)

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W 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M24	220017	DUAL OPTO ISOLATOR	FAIRCHILD	FCD880	-
M25	260022	LINEAR IC OP AMP	NATIONAL	LF 355	2
M26	280022	QUAD BILATERAL SWITCH	MOTOROLA	MC14016 BCP	1
M27	280008	QUAD 2 I/P NAND GATE	"	MC14011 BCP	-
M28	280044	BINARY UP/DOWN COUNTER	"	MC14516 BCP	1
M29	280011	DUAL D FLIP-FLOP	"	MC14013 BCP	1
M30		NOT USED			-
M31	260022	LINEAR I.C. OP AMP	NATIONAL	LF 355	-
M32	260026	" " " "	"	LM 212 H	1
M33	260002	" " " "	FAIRCHILD	741 HC	1
M34	260013	" " " "	NATIONAL	LF 356 H	1
M35 *	290082	4051 MUX SELECTED	DATRON	MC14051 BCL (GREEN)	1
M36	290047	212 OP AMP SELECTED	DATRON	LM212H (GREEN/WHITE)	1
M37		NOT USED			-
M38		NOT USED			-
M39	260028	DUAL LINEAR I.C.	FAIRCHILD	μA1458CTC	1

NOTES * ALTERNATIVE 290081 MC14051BCL (WHITE)

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy.
RL1 *	330003	RELAY 2P2W CROSS BAR	P & B	R10-E1-L2-Q5-BK-(25207)	1
RL2	330012	RELAY REED 1A GUARDED	HAMLIN	HE 721A 5134	1
	400379/1	WIRE / TERMINAL ASSY			7
	400379/2	" " "			4
	410095-5A	P.C.B.			1
	459112	RELAY BRACKET	KDP		1
	540002	22 SWG TINNED COPPER WIRE			A/R
	540008	7/0.2 PTFE INSUL WHITE WIRE			170 mm
	590001	SLEEVE MAX CABLE Ø 3.0	HELLERMANN ELECTRIC	H15 x 20 mm BLK HELSYN	5
	590004	SLEEVE - PTFE	-"- -"-	FE10	A/R
	590055	SLEEVE Ø 1.0 SIL. RUBBER	-"- -"-	HIS CONT. BLACK	230mm
	571075/C	16 WAY AP/3M RIBBON CABLE	DATRON		1
	602001	F.S.V. TERMINAL	MOLEX	02-04-1875	6
J 4,5	605002	16 WAY DIL SOCKET	JERMYN	A23-2001/Y	2
	605060	14 WAY DIL SOCKET	ASTRALUX	ICL 143-53T	8
	605061	16 WAY DIL SOCKET	ASTRALUX	ICL 143-56T	11
J1 & J6	605052	8 WAY POLARISED SOCKET	MOLEX	22-01-2085	2
	605059	8 WAY DIL SOCKET	ASTRALUX	ICL-083-36T	4
	606005	CLIP FOR 605002	ANTIFERENCE	RC-74	2

NOTES * ALTERNATIVE RELAY 330015 (OMRON) — USE M2.3 FULL HEX NUT 615014

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
	611004	SCREW M3 x 6mm POZI PAN	GKN	ZINC PLATED	1
	613005	WASHER M3 INT/SHAKEPROOF ST	GKN	"	1
	615002	NUT M3 FULL HEX STEEL		" "	1
	617010	NYLATCH PLUNGER HN3P	RICHCO	HN3P-32-4-1	7
	617011	" GROMMET HN3G	"	HN3G-32-1	7
	620005	CLOVERLEAF P.T.F.E. TERM.	SEALECTRO	FTE 15 P20	8
	620001	CLOVERLEAF P.T.F.E. TERM.	SEALECTRO	FTE12 P20	2
	620003	SOLDER PCB TERMINAL LUG	HARWIN	HZ105A	4
	630036	STANDARD STEATITE INSUL. BEAD	PARK ROYAL PORCELAIN CO	TYPE N°1 (18 SWG)	6
	615005	NUT 3-48 UNC FULL HEX STEEL.			1
	613014	WASHER M2·5 INT/SHAKEPROOF ST.	GKN DISTRIBUTORS.	ZINC PLATED	1
	900004	SILICONE RUBBER COMPOUND	R.S. COMPONENTS	554-119	A/R

NOTES

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SHEET 1 of 2

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000103	10k 5% ¼W CARBON	MULLARD	CR25	21
R2	000103	10k " " "	"	"	—
R3	000103	10k " " "	"	"	—
R4	000103	10k " " "	"	"	—
R5	000103	10k " " "	"	"	—
R6	000102	1k " " "	"	"	9
R7	000103	10k " " "	"	"	—
R8	000472	4k7 " " "	"	"	8
R9	000102	1k " " "	"	"	—
R10	000684	680k " " "	"	"	3
R11	063204	200k POT CERMET	BECKMAN	72P	1
R12	000103	10k 5% ¼W CARBON	MULLARD	CR25	—
R13	000102	1k " " "	"	"	—
R14		NOT USED			—
R15	000472	4k7 5% ¼W CARBON	"	"	—
R16	000332	3k3 " " "	"	"	3
R17	000683	68k " " "	"	"	2
R18	000222	2k2 " " "	"	"	7
R19	000393	39k " " "	"	"	1
R20	000104	100k			14
R21	000104	100k			—
R22	000104	100k " " "	"	"	—
R23	000221	220R " " "	"	"	2

NOTES. CIRCUIT DIAGRAM = 430422
CHECK PROCEDURE = 460422
CHECK LIST = 470422
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	A	B	1	2	3	4	5
ECO	—	—	—	1153.1159	1181.1188	1214	1243.51.53
DATE	—	23.7.80	1/8/80	22.9.80	23.12.80	11.6.81	2.12.81
CHKD	—			MD	MD	MD	MD

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TITLE 1065 DIGITAL PCB. ASSY
DRAWING NUMBER 400422
SHEET 2 OF 16

J.W. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R24	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R25	000332	3k3 " " "	"	"	—
R26	000103	10k " " "	"	"	—
R27	000102	1k " " "	"	"	—
R28	000682	6k8 " " "	"	"	1
R29	000104	100k " " "	"	"	—
R30		NOT USED			—
R31	000472	4k7 " " "	"	"	—
R32	000472	4k7 " " "	"	"	—
R33	000222	2k2 " " "	"	"	—
R34	000104	100k " " "	"	"	—
R35	000104	100k " " "	"	"	—
R36	000104	100k " " "	"	"	—
R37	000106	10M 10% " "	"	"	1
R38	000104	100k 5% " "	"	"	—
R39	000103	10k " " "	"	"	—
R40	000103	10k " " "	"	"	—
R41	000332	3k3 " " "	"	"	—
R42	000103	10k " " "	"	"	—
R43	000104	100k " " "	"	"	—
R44	000103	10k " " "	"	"	—
R45	000364	360k " " "	"	"	1
R46	000472	4k7 " " "	"	"	—

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SHEET 3 OF 16

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
R47	000103	10k 5% ¼W CARBON	MULLARD	CR25	—
R48	000104	100k " " "	"	"	—
R49	000103	10k " " "	"	"	—
R50	000104	100k " " "	"	"	—
R51	000562	5k6 " " "	"	"	1
R52	000224	220k " " "	"	"	1
R53	000123	12k " " "	"	"	1
R54	000105	1M " " "	"	"	1
R55	000684	680k " " "	"	"	—
R56	000823	82k " " "	"	"	1
R57		NOT USED			—
R58	000100	10R " " "	"	"	2
R59	000220	22R " " "	"	"	2
R60	000220	22R " " "	"	"	—
R61	000100	10R " " "	"	"	—
R62		NOT USED			—
R63	000222	2k2 5% ¼W CARBON	MULLARD	CR25	—
R64	000222	2k2 " " "	"	"	—
R65	000103	10k " " "	"	"	—
R66	000103	10k " " "	"	"	—
R67	000271	270R " " "	"	"	1
R68	000103	10k " " "	"	"	—
R69	000561	560R " " "	"	"	1

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SHEET 4 OF 16

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
R70	000222	2k2 5% ¼W CARBON	MULLARD	CR25	—
R71	000102	1k " " "	"	"	—
R72	000221	220R " " "	"	"	—
R73	000102	1k " " "	"	"	—
R74	000124	120k " " "	"	"	1
R75	000471	470R " " "	"	"	1
R76	000824	820k " " "	"	"	1
R77		NOT USED			—
R78		NOT USED			—
R79	000472	4k7 " " "	"	"	—
R80	000683	68k " " "	"	"	—
R81	000183	18k " " "	"	"	1
R82	000334	330k " " "	"	"	1
R83	063202	2K POT CERMET	BECKMAN	72 P	1
R84	000223	22k 5% ¼W CARBON	MULLARD	CR25	1
R85	000472	4k7 " " "	"	"	—
R86		NOT USED			—
R87	000104	100k			—
R88	000103	10k " " "	"	"	—
R89	000103	10k " " "	"	"	—
R90		NOT USED			—
R91	012002	20kΩ 1% ⅛W 50ppm MF	HOLCO	HQC	1
R92	015231	5k23 " " "	"	"	1

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SHEET 5 OF 16

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R93		NOT USED			—
R94	000102	1k 5% ¼W CARBON	MULLARD	CR25	—
R95	000472	4k7 " " "	"	"	—
R96	000103	10k " " "	"	"	—
R97	000222	2k2 " " "	"	"	—
R98		NOT USED			—
R99	000104	100k 5% ¼W CARBON	"	"	—
R100	000104	100k " "	"	"	—
R101	000684	680k " "	"	"	—
R102	000103	10k " " "	"	"	—
R103	000222	2k2 " " "	"	"	—
R104	000102	1k " "	"	"	—
AN1	090046	10k x 7 2% NETWORK	BECKMAN	764-1-R10k	5
AN2		NOT USED			—
AN3	090046	10k x 7 2% NETWORK	BECKMAN	764-1-R10k	—
AN4	090042	8 BIT 'R-2R' LADDER NETWORK	SEE DRG		1
AN5	090046	10k x 7 2% NETWORK	BECKMAN	764-1-R10k	—
AN6	090046	10k x 7 2% NETWORK	BECKMAN	764-1-R10k	—
AN7	090046	10k x 7 2% NETWORK	BECKMAN	764-1-R10K	—

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SHEET 6 OF 16

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy.
C1	150002	10µF 20% 16v DIP TANT	UNION CARBIDE	K10E16	14
C2	150002	10µF " " " "	" "	"	—
C3	150002	10µF " " " "	" "	"	—
C4	150016	1µF " 35v " "	" "	K1R0E35	7
C5	110013	·1µF 10% 250v POLYESTER	MULLARD	C280AE/P100k	3
C6	101103	·01µF 250v CER DISC	ERIE	801	6
C7	150006	4·7µF 20% 16v DIP TANT	UNION CARBIDE	K4R7E16	1
C8		NOT USED			—
C9	150002	10µF 20% 16v DIP TANT	UNION CARBIDE	K10E16	—
C10	102101	100pF 500v CER DISC	ERIE	801	5
C11	150002	10µF 20% 16v DIP TANT	UNION CARBIDE	K10E16	—
C12	150016	1µF " 35v " "	" "	K1R0E35	—
C13	150002	10µF " 16v " "	" "	K10E16	—
C14	110013	0·1µF 10% 250v POLYESTER	MULLARD	C280AE/P100K	—
C15	150002	10µF 20% 16v DIP TANT	UNION CARBIDE	K1R0E16	—
C16	102221	220pF 500v CER DISC	ERIE	801	3
C17	150002	10µF 20% 16v DIP TANT	UNION CARBIDE	K10E16	—
C18	150002	10µF " " " "	" "	"	—
C19	150016	1µF " 35v " "	" "	K1R0E35	—
C20	150002	10µF " " " "	" "	K10E16	—
C21	102101	100pF 500v CER DISC	ERIE	801	—
C22	101103	·01µF 250v CER DISC	ERIE	801	—
C23	120016	2n2F 20% 100v POLYCARB	WIMA	FKC 2 MKH	1

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
C24	130016	130pF 2½% 25v POLYSTYRENE	SUFLEX	HSQ130/2½-7/25	1
C25	102471	470pF 500v Cer Disc	ERIE	801	2
C26	150016	1µF 20% 35v DIP TANT	UNION CARBIDE	KIROE35	—
C27	150002	10µF " 16v " "	" "	K10E16	—
C28	102220	22pF 500v CER DISC	ERIE	801	3
C29	150016	1µF 20% 35v DIP TANT	UNION CARBIDE	KIROE35	—
C30	150002	10µF 20% 16V " "	" "	K10E16	—
C31	110005	·01µF 10% 250v POLYESTER	MULLARD	C280AE/P10K	1
C32	110003	·068µF			1
C33	150014	·68µF 20% 35v DIP TANT	UNION CARBIDE	KR68E35	1
C34	101103	·01µF 250v CER DISC	ERIE	801	—
C35	150002	10µF 20% 16V DIP TANT	UNION CARBIDE	K10E16	—
C36	101103	·01µF 250v CER DISC	ERIE	801	—
C37	102220	22pF 500v CER DISC		"	—
C38	102221	220pF 500v " "	"	"	—
C39	101103	·01µF 250v " "	"	"	—
C40	110013	·1µF 10% 250v POLYESTER	MULLARD	C280AE/P100k	—
C41	110027	3n3F 20% 100V POLYESTER	WIMA	FKS2MIN	1
C42	102471	470pF 500v CER DISC	ERIE	801	—
C43	102101	100pF 500v CER DISC	"	801	—
C44	150002	10µF 20% 16v DIP TANT	UNION CARBIDE	K10E16	—
C45	150016	1µF 20% 35v " "	" "	KIROE35	—
C46	102220	22pF 500v CER DISC	ERIE	801	—

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DRAWING NUMBER 400422 SHEET 8 OF 16

J.W. 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
C47	150004	100µF 20% 6V3 DIP TANT.	UNION CARBIDE	K100E6V3	1
C48		NOT USED			—
C49	101103	·01µF 250v CER. DISC	ITT	CD10	—
C50	102101	100pF 500v CER. DISC	ITT	801	—
C51	102101	100pF 500v CER. DISC	ITT	801	—
C52		NOT USED			—
C53	102221	220pF 500v CER. DISC	ERIE	801	—
C54	130008	68pF 5% 160v POLYSTYRENE	SUFLEX	HS	1
C55	150016	1µF 20% 35v DIP TANT	UNION CARBIDE	K10E16	—

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
D1	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	10
D2	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D3	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D4	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D5	200008	200mA 125v LL Si DIODE	FAIRCHILD	IN458A	1
D6	220010	Si HOT CARRIER DIODE	HP	HSCH1001/IN6263	1
D7	210027	2V7 400mW ZENER	MULLARD	BZY88C2V7	1
D8	210033	3V3 400mW ZENER	MULLARD	BZY88C3V3	1
D9	220022	DUAL 37pF VARICAP DIODE	THOMPSON – CSF	BB204B	2
D10	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D11	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D12	200002	1A. 50v. GP. Si. DIODE	FAIRCHILD	IN4001	2
D13	213006	5V 5W ZENER	UNITRODE	TVS505	1
D14	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D15	200001	75mA 75v GP. Si. DIODE	FAIRCHILD	IN4148	–
D16	200002	1A. 50v. GP. Si. DIODE	FAIRCHILD	IN4001	–
D17	200001	Si GP. DIODE	FAIRCHILD	IN4148	–
D18		NOT USED			–
D19		NOT USED			–
D20	220022	DUAL 37pF VARICAP DIODE	THOMPSON – CSF	BB204B	–
D21	200001	75mA 75v GP Si. DIODE	FAIRCHILD	IN4148	–

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
Q1	240001	Si NPN TRANSISTOR	NATIONAL	BC184	5
Q2	240001	" " "	"	"	–
Q3	240007	" " "	"	2N3646	2
Q4		NOT USED			–
Q5	240006	Si NPN TRANSISTOR	NATIONAL	2N3904	2
Q6	250004	Si PNP "	"	2N3906	3
Q7	250004	" " "	"	"	–
Q8	240001	" NPN "	"	BC184	–
Q9	240001	" " "	"	"	–
Q10	250001	" PNP "	"	BC214	1
Q11					–
Q12	250011	" PNP "	"	BC327	1
Q13	240007	" NPN "	"	2N3646	–
Q14	240001	" " "	"	BC184	–
Q15	240006	" " "	"	2N3904	–
Q16	250004	" PNP "	"	2N3906	–
Q17	250008	" " "	"	BC214KC	1

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M1	280011	DUAL D FLIP-FLOP	MOTOROLA	MC14013BCP	2
M2	280022	QUAD BILATERAL SWITCH	"	MC14016BCP	1
M3	280024	TRI-STATE HEX NON-INV. BUFFER	"	MC14503BCP	7
M4	280024	" " " " " "	"	"	—
M5	280024	" " " " " "	"	"	—
M6	280024	" " " " " "	"	"	—
M7	280015	QUAD LATCH	"	MC14076BCP	5
M8	280015	" "	"	"	—
M9	280015	" "	"	"	—
M10	280024	TRI-STATE HEX NON-INV BUFFER	"	MC14503BCP	—
M11	280015	QUAD LATCH	"	MC14076BCP	—
M12	280015	" "	"	"	—
M13	280044	BINARY UP/DOWN COUNTER	"	MC14516BCP	4
M14	280044	" " " "	"	"	—
M15	290003	TIMER - ASTABLE	SIGNETICS	NE 555V	3
M16	270058	DUAL 1-of-4 DECODER	NATIONAL	74LS155	2
M17	270048	QUAD 2 I/P NAND GATE	NATIONAL	74LS00	2
M18		NOT USED			—
M19	280066	256x4 BIT STATIC CMOS RAM	SEE DRAWING		2

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
M20	280066	256x4 BIT STATIC CMOS RAM	SEE DRAWING		—
M21	270064	QUAD TRISTATE BUFFER	NATIONAL	DM74LS125N	1
M22	280011	DUAL D FLIP-FLOP	"	MC14013BCP	—
M23	270053	A-D CHIP	FERRANTI	ZNA 2035	1
M24	280024	TRI-STATE HEX NON-INV BUFFER	MOTOROLA	MC14503BCP	—
M25	280024	" " " " " "	"	"	—
M26	280006	DUAL J-K FLIP-FLOP	"	MC14027BCP	1
M27	280004	14BIT BINARY COUNTER	"	MC14020BCP	1
M28	270055	DUAL 4 I/P NAND GATE	NATIONAL	74LS20	3
M29	270055	DUAL 4 I/P NAND GATE	"	74LS20	—
M30	290086-2	4k x 8 EPROM - SEE PROG. SPEC		TMS 2532 JL/PROGRAM'D	1
M31	280096	1K x 4BIT STATIC CMOS RAM	SEE DRAWING		2
M32	270058	DUAL 1-of-4 DECODER	NATIONAL	74LS155	—
M33	270051	DUAL 4 I/P AND GATE	"	74LS21	1
M34	270055	DUAL 4 I/P NAND GATE	"	74LS20	—
M35	290085-2	4k x 8 EPROM - SEE PROG. SPEC		TMS 2532 JL/PROGRAM'D	1
M36	280096	1K x 4BIT STATIC CMOS RAM	SEE DRAWING		—
M37	280025	QUAD BILATERAL SWITCH	MOTOROLA	MC14066BCP	2
M38	280071	TRIPLE 3 I/P NOR GATE	MULLARD	HEF4025P	2
M39	280017	HEX INVERTER	MOTOROLA	MC14069BCP	1
M40	280083	QUAD 2 I/P NOR GATE	MULLARD	HEF4001BP	1
M41	280044	BINARY UP/DOWN COUNTER	MOTOROLA	MC14516BCP	—
M42	280003	QUAD LATCH	"	MC14042BCP	2

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JW 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M43	290003	TIMER - ASTABLE	SIGNETICS	NE 555V	—
M44	270048	QUAD 2 I/P NAND GATE	NATIONAL	74 LS00	—
M45	270050	HEX INVERTER	"	74 LS 04	1
M46	280025	QUAD BILATERAL SWITCH	MOTOROLA	MC14066BCP	—
M47	280070	DIVIDE-BY-8 COUNTER/DIVIDER	MULLARD	HEF 4022P	1
M48	280071	TRIPLE 3 I/P NOR GATE	"	HEF 4025P	—
M49	280023	QUAD 2 I/P NOR GATE	MOTOROLA	MC14001 BCP	1
M50	280044	BINARY UP/DOWN COUNTER	"	MC14516 BCP	—
M51	280003	QUAD LATCH	"	MC 14042 BCP	—
M52	270056	8 I/P NAND GATE	NATIONAL	74 LS30	1
M53	280061	MICRO PROCESSOR CHIP	MOTOROLA	MC 6800L	1
M54	270023	QUAD 2 I/P NAND GATE	NATIONAL	7437	1
M55	270054	QUAD 2 I/P AND GATE	"	74 LS 08	2
M56	270054	" " " "	"	"	—
M57	270057	DUAL JK FLIP-FLOP	"	74 LS 76	1
M58	280009	HEX INVERTER/BUFFER	MOTOROLA	MC14049	2
M59	280009	HEX INVERTER/BUFFER	MOTOROLA	MC14049	—
M60, M62	260031	VOLTAGE DETECTOR	INTERSIL	ICL8211	2
M61	290003	TIMER - ASTABLE	SIGNETICS	NE 555V	—
S1		NOT USED			—
S2		NOT USED			—
S3		NOT USED			—

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
L1	370003	1000μH 40Ω R.F. CHOKE	SIGMA	SC10/1000	1
L2	370002	100μH 40Ω " "	TOKO	YXRS 18576	1
	590004	SLEEVE - PTFE	HELLERMAN ELECTRIC	FE10	A/R
TP1- TP33, LINKS	540002	22 SWG. BTC WIRE			A/R
	920048	BUS STRIP	MEKTRON	M823 14.7.3F	1
	590055	SLEEVE Ø1.0 SIL. RUBBER	HELLERMANN ELECTRIC	HIS CONT. BLACK	10 mm
	630098	COMPONENT CLIP	RICHCO	KKU-8	1
	606005	CLIP FOR 605002	ANTIFERENCE	RC 74	2
J2, J4	605002	16 WAY D.I.L. LOW PROFILE SKT.	JERMYN OR ANTIFERENCE	A23-2001/Y OR ICN-163-S3	2
	605065	28 WAY D.I.L. " " "	AUGAT	328-AG39D	1
	605060	14 WAY D.I.L. SOCKET	ASTRALUX OR JERMYN	ICL 143-S3T	22
J1	605061	16 WAY D.I.L. SOCKET	" "	ICL 163-S6T	30
	605050	40 WAY D.I.L. SOCKET	AUGAT	340-AG39D	1
	605063	22 WAY D.I.L. SOCKET	AUGAT	322-AG39D	2
	605064	24 WAY D.I.L. SOCKET	"	324-AG39D	2
	540006	1/0.4 BLK. PTFE INSUL. WIRE		TO BSG210 TYPE A	A/R.
JL3	604037	PROGRAMMING CLASS160 PLUG	"	8136-475G-8	1
	605059	8 WAY D.I.L. SOCKET	ASTRALUX	ICL-083-S6T	1
J5	605052	8 WAY POLARISED SOCKET	"	22-01-2085	1
	617010	NYLATCH PLUNGER	ORDER FROM GJ FOX & SONS	HN3P-32-4-1	8
	617011	NYLATCH GROMMET	" " " "	HN3G-32-1	8
	605062	18 WAY D.I.L SOCKET	AUGAT	318-AG39D	2
	410096-9	PCB			1

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
	400379/1	WIRE/TERMINAL ASSY.			8
J6		NOT USED			—
J7		NOT USED			—
	620003	SOLDER PCB TERMINAL LUG	HARWIN	H2105A	5
J3	605102	24 WAY D.I.L SOCKET GOLD	CA	CA-24S-105D	1

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
R1	090074	8k2 ·25% 15ppm MF	ACI	SEE DRG	1
R2	011181	1K18 1% 1/8W 50ppm MF	HOLCO	H8C	1
R3	015900	590R 1% 1/8W 50ppm MF	HOLCO	H8C	1
R4	012940	294R 1% 1/8W 50ppm MF	HOLCO	H8C	1
R5	011470	147R 1% 1/8W 50ppm MF	HOLCO	H8C	1
R6	090074	16k ·25% 15ppm MF	ACI	SEE DRG	–
R7		NOT USED			–
R8	000394	390k 5% 1/4W CARBON	MULLARD	CR25	1
R9	000103	10k 5% 1/4W CARBON	MULLARD	CR25	3
R10		NOT USED			–
R11		NOT USED			–
R12	000152	1K5 5% 1/4W CARBON	MULLARD	CR25	2
R13	000224	220k 5% 1/4W CARBON	MULLARD	CR25	1
R14	000333	33k 5% 1/4W CARBON	MULLARD	CR25	3
R15	000104	100k 5% 1/4W CARBON	MULLARD	CR25	3
R16	000685	6M8 5% 1/4W CARBON	MULLARD	CR25	1
R17	000332	3k3 5% 1/4W CARBON	MULLARD	CR25	6
R18	090071	100k ·25% 15ppm MF	ACI	SEE DRG	1
R19	090071	100k ·25% 15ppm MF	ACI	SEE DRG	–
R20		FSV (270k NOM)	MULLARD	CR25	–
R21	000821	820R 5% 1/4W CARBON	MULLARD	CR25	1
R22	290026	RMS KIT	DATRON	SEE DRG	1
R23	000270	27R 5% 1/4W CARBON	MULLARD	CR25	1

NOTES * NOT USED ON ASSEMBLIES FITTED INTO 1061's

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ISS	A	B	1	2	3	4	5	
ECO	—	—	—	1150 1152 1155 1162	1202	1217	1233	
DATE		24.7.80	1/8/80	8/9/80	6.8.81	9.8.81	28.1.81	
CHKD		PRG		MD	MD	MD	MD	

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JW 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
R24	000686	68M 10% 1/4W CARBON	ALLEN BRADLEY	CB10	1
R25	000221	220R 5% 1/4W CARBON	MULLARD	CR25	3
R26	000154	150k 5% 1/4W CARBON	MULLARD	CR25	1
R27	000274	270k 5% 1/4W CARBON	MULLARD	CR25	1
R28	290026	RMS KIT	DATRON	SEE DRG	–
R29	000226	22M 5% 1/4W CARBON	MULLARD	CR25	1
R30		NOT USED			–
R31		NOT USED			–
R32	000182	1K8 5% 1/4W CARBON	MULLARD	CR25	1
R33	000333	33k 5% 1/4W CARBON	MULLARD	CR25	–
R34	000103	10k 5% 1/4W CARBON	MULLARD	CR25	–
R35	063500	50R POT 3/8"SQ CERMET	BECKMAN	72P	2
R36		NOT USED			–
R37		NOT USED			–
R38	000683	68k 5% 1/4W CARBON	MULLARD	CR25	1
R39		NOT USED			–
R40	000183	18k 5% 1/4W CARBON	MULLARD	CR25	2
R41	000332	3k3 5% 1/4W CARBON	MULLARD	CR25	–
R42	000332	3k3 5% 1/4W CARBON	MULLARD	CR25	–
R43	000332	3k3 5% 1/4W CARBON	MULLARD	CR25	–
R44	000331	330R 5% 1/4W CARBON	MULLARD	CR25	2
R45	000680	68R 5% 1/4W CARBON	MULLARD	CR25	1
R46	000472	4K7 5% 1/4W CARBON	MULLARD	CR25	1

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
R47	090070	4k7 ·25% 15 ppm MF	ACI	SEE DRG	1
R48	090071	8k975·25% 15 ppm MF	ACI	SEE DRG	—
R49	000912	9k1 5% 1/4W CARBON	MULLARD	CR25	1
R50	063500	50R POT 3/8" SQ. CERMET	BECKMAN	72P	—
R51	000565	5M6 5% 1/4W CARBON	MULLARD	CR25	1
R52		NOT USED			—
R53		NOT USED			—
R54		NOT USED			—
R55		NOT USED			—
R56	000103	10k 5% 1/4W CARBON	MULLARD	CR25	—
R57	000105	1M 5% 1/4W CARBON	MULLARD	CR25	4
R58		NOT USED			—
R59	000120	12R 5% 1/4W CARBON	MULLARD	CR25	2
R60	000120	12R 5% 1/4W CARBON	MULLARD	CR25	—
R61	000222	2k2 5% 1/4W CARBON	MULLARD	CR25	4
R62	000332	3k3 5% 1/4W CARBON	MULLARD	CR25	—
R63	000222	2k2 5% 1/4W CARBON	MULLARD	CR25	—
R64	000222	2k2 5% 1/4W CARBON	MULLARD	CR25	—
R65	000101	100R 5% 1/4W CARBON	MULLARD	CR25	3
R66	000221	220R 5% 1/4W CARBON	MULLARD	CR25	—
R67	000183	18k 5% 1/4W CARBON	MULLARD	CR25	—
R68	090071	18k ·25% 15 ppm MF	ACI	SEE DRG	—
R69	090070	4k7 ·25% 15 ppm MF	ACI	SEE DRG	—

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
R70	000272	2k7 5% 1/4W CARBON	MULLARD	CR25	2
R71	000272	2k7 5% 1/4W CARBON	MULLARD	CR25	—
R72	000151	150R 5% 1/4W CARBON	MULLARD	CR25	1
R73	000105	1M 5% 1/4W CARBON	MULLARD	CR25	—
R74	000564	560k 5% 1/4W CARBON	MULLARD	CR25	1
R75	063504	500k POT 3/8"SQ CERMET	BECKMAN	72P	2
R76	090073	62k6 ·25% 15 ppm MF	ACI	SEE DRG	1
R77	000104	100k 5% 1/4W CARBON	MULLARD	CR25	—
R78	000225	2M2 5% 1/4W CARBON	MULLARD	CR25	2
R79	000114	110k 5% 1/4W CARBON	MULLARD	CR25	1
R80	000561	560R 5% 1/4W CARBON	MULLARD	CR25	1
R81	000101	100 R 5% 1/4W CARBON	MULLARD	CR25	—
R82	000101	100R 5% 1/4W CARBON	MULLARD	CR25	—
R83		NOT USED			—
R84		NOT USED			—
R85		NOT USED			—
R86		NOT USED			—
R87		NOT USED			—
R88		NOT USED			—
R89		NOT USED			—
R90	063204	200k POT 3/8" SQ. CERMET	BECKMAN	72P	1
R91	000105	1M 5% 1/4W CARBON	MULLARD	CR25	—
R92	000105	1M 5% 1/4W CARBON	MULLARD	CR25	—

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TITLE AC PCB ASSY 1065

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JW 1184

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
R93	000225	2M2 5% 1/4W CARBON	MULLARD	CR25	-
R94		NOT USED			-
R95		NOT USED			-
R96		NOT USED			-
R97		NOT USED			-
R98		NOT USED			-
R99		NOT USED			-
R100		NOT USED			-
R101	000471	470R 5% 1/4W CARBON	MULLARD	CR25	2
R102	090073	62k6 ·25% 15ppm MF	ACI	SEE DRG	-
R103	000221	220R 5% 1/4W CARBON	MULLARD	CR25	-
R104	000163	16k 5% 1/4W CARBON	MULLARD	CR25	1
R105	000623	62k 5% 1/4W CARBON	MULLARD	CR25	1
R106	011001	1k00 1% 1/8W 50ppm MF	HOLCO	H8C	3
R107	011803	180k 1% 1/8W 50ppm MF	HOLCO	H8C	1
R108	042215	22M1 1% 1/2W 100ppm MF	ALLEN BRADLEY	CC	2
R109	090072	1k ·25% 15ppm MF	ACI	SEE DRG	1
R110	090072	10k1 ·25% 15ppm MF	ACI	SEE DRG	-
R111	090072	111k ·25% 15ppm MF	ACI	SEE DRG	-
R112	063504	500k POT 3/8" SQ CERMET	BECKMAN	72P	-
R113	042215	22M1 1% 1/2W 100ppm MF	ALLEN BRADLEY	CC	-
R114	090072	1M ·25% 15ppm MF	ACI	SEE DRG	-
R115	000822	8k2 5% 1/4W CARBON	MULLARD	CR25	1

NOTES

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy
C1	120018	1μ5F 10% 63v POLYCARB	ASHCROFT	A2B1521B	1
C2	120030	820nF 10% 63v POLYCARB	ASHCROFT	SEE DRG.	1
C3	120021	470nF % 63v POLYCARB	ASHCROFT	A2B4711B	2
C4	120024	6μ8F 10% 63v POLYCARB	ASHCROFT	A2B6821B	1
C5	120020	220nF 10% 63v POLYCARB	ASHCROFT	A2B2211B	1
C6	150012	100nF 20% 35v DIP TANT	UNION CARBIDE	KR10E35	1
C7	120021	470nF 10% 63v POLYCARB	ASHCROFT	A2B4711B	—
C8	102680	68pF 5% 500v CER DISC	ITT	CD10	2
C9	102680	68pF 5% 500v CER DISC	ITT	CD10	—
C10	102331	330pF 10% 500v CER DISC	ITT	CD10	1
C11	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	7
C12	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100k	5
C13	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
C14	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
C15	101103	10nF 25% 250v CER DISC	ITT	CD10	
C16	150003	47μF 20% 6V3 DIP TANT	UNION CARBIDE	K47E6V3	1
C17	102101	100pF 10% 500v CER DISC	ITT	CD10	1
C18	130070	13pF ±1pF 160v POLYSTYRENE	SUFLEX	HS13/1-7/160	1
C19		NOT USED			—
C20		NOT USED			—
C21	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100k	—
C22	102150	15pF 5% 500v CER DISC	ITT	CD10	2
C23	102150	15pF 5% 500v CER DISC	ITT	CD10	—

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TITLE AC PCB ASSY 1065

DRAWING NUMBER 400425 SHEET 8 OF 17

J.W 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C24	102478	4p7F ±·5pF 500v CER DISC	ITT	CD08	2
C25	102478	4p7F ±·5pF 500v CER DISC	ITT	CD08	—
C26	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
C27	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
C28		NOT USED			—
C29	130071	150pF 1% 160v POLYSTYRENE	SUFLEX	HSQ150/1-7/160	2
C30	130013	18pF ±1pF 160v POLYSTYRENE	SUFLEX	HS	1
C31	110013	100nF 20% 250v POLYESTER	MULLARD	C280AEP100k	—
C32	110035	220nF 20% 63V POLYESTER	WIMA	MKS2 MIN	2
C33	110035	220nF 20% 63v POLYESTER	WIMA	MKS2 MIN	—
C34		NOT USED			—
C35		NOT USED			—
C36		NOT USED			—
C37		NOT USED			—
C38		NOT USED			—
C39		NOT USED			—
C40		NOT USED			—
C41	102101	100pF 10% 500v CER DISC	ITT	CD10	1
C42	130072	9p1F ±·5pF 160v POLYSTYRENE	SUFLEX	HS 9·1/·5-7/160	1
C43	130071	150pF 1% 160v POLYSTYRENE	SUFLEX	HSQ150/1-7/160	—
C44	150020	10μF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
C45	102120	12pF 5% 500v CER DISC	ITT	CD10	1
C46		NOT USED			—

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
C47	101103	10nF 25% 250v CER DISC	ITT	CD10	—
C48	140035	10nF 1% 125v SILV. MICA	ITT	454/274	1
C49	140034	1nF 1% 300v GLASS	ELECTROSIL	CYFM15	1
C50	110013	100nF 20% 250v POLYESTER	MULLARD	C280AE P100k	—
C51	140033	91pF 1% 500v GLASS	ELECTROSIL	CYFM10	1
C52	110026	6n8F 20% 100v POLYESTER	WIMA	FKS2 MIN	1
C53	101103	10nF 25% 250v CER DISC	ITT	CD10	—
C54	101103	10nF 25% 250v CER DISC	ITT	CD10	—
C55	140039	15pF 5% 500v GLASS	ELECTROSIL	CYFM10	2
C56	150020	10µF 20% 25v DIP TANT	UNION CARBIDE	K10E25	—
C57	120001	220nF 10% 1kV POLYCARB	SUFLEX	SN1380	1
C58	140031	13pF 5% 500v GLASS	ELECTROSIL	CYFM10	1
C59	140032	18pF 10% 500v GLASS	ELECTROSIL	CYFM10	1
C60	140039	15pF 5% 500v GLASS	ELECTROSIL	CYFM10	—
C61		NOT USED			—
C62	140036	25pF 1kV TRIMMER	JACKSON	TETFER VPC S646	2
C63	140036	25pF 1kV TRIMMER	JACKSON	TETFER VPC S646	—
C64		NOT USED			—
C65		NOT USED			—
C66	102220	22pF 5% 500v CER DISC	ITT	CD10	2
C67	102220	22pF 5% 500v CER DISC	ITT	CD10	—
C68		NOT USED			—
C69		NOT USED			—

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No USED Per Assy.
C70		NOT USED			—
C71	102470	47pF 5% 500v CER DISC	ITT	CD10	1
C72	110013	100nF 20% 250v POLYESTER	MULLARD	C280AE P100K	—
C73	102471	470pF 10% 500v CER DISC	ITT	CD10	1

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
D1	220010	Si HOT CARRIER DIODE	HP	HSCH1001/IN6263	3
D2	200008	200mA 125V LL Si DIODE	FAIRCHILD	IN458A	4
D3	200008	200mA 125V LL Si DIODE	FAIRCHILD	IN458A	–
D4	200008	200mA 125V LL Si DIODE	FAIRCHILD	IN458A	–
D5		NOT USED			–
D6	200008	200mA 125V LL Si DIODE	FAIRCHILD	IN458A	–
D7	210100	10v 400mW ZENER	MULLARD	BZY88C10	1
D8	220010	Si HOT CARRIER DIODE	HP	HSCH1001/IN6263	–
D9	220010	Si HOT CARRIER DIODE	HP	HSCH1001/IN6263	–
D10		NOT USED			–
D11	220021	QUAD 29pF VARICAP DIODE	THOMPSON-CSF	BB109G4	SET OF 4
D12		NOT USED			–
D13	200001	75mA 75V GP Si DIODE	FAIRCHILD	IN4148	2
D14	220020	FET DIODE 100pA IR	TELEDYNE	PAD100	3
D15	220020	FET DIODE 100pA IR	TELEDYNE	PAD100	–
D16	200001	75mA 75V GP Si DIODE	FAIRCHILD	IN4148	–
D17	220020	FET DIODE 100pA IR	TELEDYNE	PAD100	–

NOTES

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy.
Q1	230002	N-CHAN JFET	TELEDYNE	U1994JF	3
Q2	230002	N-CHAN JFET	TELEDYNE	U1994JF	–
Q3	230027	N-CHAN JFET	TELEDYNE	U3114JF	1
Q4		NOT USED			–
Q5		NOT USED			–
Q6		NOT USED			–
Q7	240013	Si NPN TRANSISTOR	NATIONAL	BC184C/TO18	1
Q8	250008	Si PNP TRANSISTOR	NATIONAL	BC214C/TO18	3
Q9		NOT USED			–
Q10		NOT USED			–
Q11	250004	Si PNP TRANSISTOR	NATIONAL	2N3906/TO18	5
Q12	240006	Si NPN TRANSISTOR	NATIONAL	2N3904/TO18	4
Q13		NOT USED	NATIONAL	BC214C/TO18	–
Q14		NOT USED	NATIONAL	BC184C/TO18	–
Q15	240006	Si NPN TRANSISTOR	NATIONAL	2N3904/TO18	–
Q16	250004	Si PNP TRANSISTOR	NATIONAL	2N3906/TO18	–
Q17	240006	Si NPN TRANSISTOR	NATIONAL	2N3904/TO18	–
Q18	250004	Si PNP TRANSISTOR	NATIONAL	2N3906/TO18	–
Q19	230035	N-CHAN JFET	TELEDYNE	U1897JF	1
Q20	250008	Si PNP TRANSISTOR	NATIONAL	BC214C/TO18	–
Q21	250008	Si PNP TRANSISTOR	NATIONAL	BC214C/TO18	–
Q22	250004	Si PNP TRANSISTOR	NATIONAL	2N3906/TO18	–
Q23	250004	Si PNP TRANSISTOR	NATIONAL	2N3906/TO18	–

NOTES

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
Q24	240006	Si NPN TRANSISTOR	NATIONAL	2N3904 / TO18	–
Q25		NOT USED			–
Q26		NOT USED			–
Q27		NOT USED			–
Q28		NOT USED			–
Q29		NOT USED			–
Q30		NOT USED			–
Q31	230002	N-CHAN JFET	TELEDYNE	U1994 JF	–
Q32	230031	N-CHAN DUAL JFET	TELEDYNE	SU2656	2
Q33	240020	Si NPN DUAL TRANSISTOR	ANALOGUE DEVICES	AD812	1
Q34	230031	N-CHAN DUAL JFET	TELEDYNE	SU2656	–

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
M1	260027	714 OP AMP	FAIRCHILD	μA714HC	2
M2	260027	714 OP AMP	FAIRCHILD	μA714HC	–
M3	280015	QUAD D-TYPE LATCH	MOTOROLA	MC14076BCP	2
M4	280015	QUAD D-TYPE LATCH	MOTOROLA	MC14076BCP	–
M5	280011	DUAL D FLIP-FLOP	MOTOROLA	MC14013BCP	1
M6	290026	RMS KIT	DATRON	SEE DRG	–
M7	270059	7x DARLINGTON DRIVER	SPRAGUE / EXAR	ULN2004A / XR2204CP	1
M8	260025	101 OP AMP	NATIONAL	LM101AH	3
M9	260025	101 OP AMP	NATIONAL	LM101AH	–
M10		NOT USED			–
M11	260025	101 OP AMP	NATIONAL	LM101AH	–
RL1		NOT USED			–
RL2 (1)	330003	RELAY 2P2W CROSS BAR	P & B	RIO-E1-L2-Q5-BK(25207)	2
RL3 (1)	330003	RELAY 2P2W CROSS BAR	P & B	RIO-E1-L2-Q5-BK(25207)	–
RL4	330012	RELAY REED 1A GUARDED	HAMLIN	HE721A5134	3
RL5	330012	RELAY REED 1A GUARDED	HAMLIN	HE721A5134	–
RL6	330012	RELAY REED 1A GUARDED	HAMLIN	HE721A5134	–

NOTES (1) ALTERNATIVE RELAY 330015 (OMRON)

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TITLE: AC PCB ASSY 1065

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
TP's, TL's.	540002	22 SWG. TINNED COPPER WIRE			A/R
	590004	SLEEVE — PTFE	HELLERMANN ELECTRIC	FE10	A/R
J1	571095/C	16WAY AP/3M RIBBON CABLE	DATRON		1
J2	605052	8 WAY POLARISED SOCKET	MOLEX	(22-01-2085) 6471-8-1	1
	590055	SLEEVE Ø1·0 SIL. RUBBER	HELLERMANN ELECTRIC	HIS CONT. BLACK	40mm
	400379/1.	WIRE/TERMINAL ASSY.			1
	410136-4	PCB			1
	450249-3	GUARD SHIELD			1
	459112-2	RELAY BRACKET			2
	605056	CRIMP TERMINAL	MOLEX	4809-TL	1
	540008	7/0·2 PTFE INSULATED (WHITE) WIRE			A/R
	590001	SLEEVE MAX. CABLE Ø3·0	HELLERMAN ELECTRIC	HIS x 20mm BLACK HELSYN	7
	602001	FSV TERMINAL	MOLEX	02-04-1875	2
	602004	BREAKAWAY TERMINAL STRIP	MOLEX	05-30-0001	16
	605060	14 PIN DIL SOCKET	ASTRALUX	ICL 143-S3T	1
	605061	16 PIN DIL SOCKET	ASTRALUX	ICL 163-S6T	3
	605057	CRIMP TERMINAL	MOLEX	4809-GL	1
	611007	SCREW M3x6mm STEEL POZI-	CSK ZN/PLATED GKN		3
	611016	SCREW M3x8mm STEEL POZI-	PAN ZN/PLATED GKN		5

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
	612021	STANDOFF M3×16 HEX STEEL	HARWIN	R6077-M3	3
	613005	WASHER M3 INT./SHAKEPROOF ST.	GKN DISTRIBUTORS	ZINC PLATED	5
	613014	WASHER M2·5 INT/SHAKEPROOF ST.	GKN DISTRIBUTORS	ZINC PLATED	2
	615002	NUT M3 FULL HEX STEEL		ZINC PLATED	2
	615005	NUT 3-48 UNC FULL HEX ST.		ZINC PLATED	2
	617010	NYLATCH PLUNGER HN3P	ORDER FROM C.J. FOX & SONS	HN3P-32-4-1	4
	617011	NYLATCH GROMMET HN3G	ORDER FROM C.J. FOX & SONS	HN3G-32-1	4
	620003	SOLDER PCB TERMINAL LUG	HARWIN	H 2105A	2
	620005	CLOVERLEAF PTFE TERMINAL	SEALECTRO	FTE 15 P20	14
	630107	BRASS STRIP ·375mm THK ×15·5	RIGHTON	½ HARD	130mm

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R1		NOT USED			
R2	090001	P.T.C. THERMISTOR	MULLARD	VA8650	2
R3	090044	4M0 1% MF	ACI		(1SET) R3 R4
R4		3K94 1% MF	ACI		–
R5		NOT USED			–
R6		NOT USED			–
R7		NOT USED			–
R8	010761	9K76 1% 50ppm M.F.	HOLCO	HB	1
R9	090001	P.T.C. THERMISTOR	MULLARD	VA8650	–
R10		NOT USED			–
R11	000106	10M 5% ¼W CARBON	MULLARD	CR25	2
R12	000563	56K " " "	"	"	2
R13	000563	56K " " "	"	"	–
R14	000104	100K " " "	"	"	7
R15		NOT USED			–
R16		NOT USED			–
R17		NOT USED			–
R18	000107	100M 10% ¼W CARBON	ALLEN BRADLEY	CB10	1
R19	000104	100K 5% ¼W CARBON	MULLARD	CR25	–
R20	041505	15M 1% 100ppm CF	ALLEN BRADLEY	CC	2
R21	041505	15M " " "	"	"	–
R22	000102	1k 5% ¼W CARBON	MULLARD	CR25	2
R23	000391	390R " " "	"	"	1

NOTES

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TITLE 1065 OHMS P.C.B ASSY

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DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy
R24	070003	57K77 0·1% WIREWOUND.	MANN		1
R25	070004	577K7 0·1% WIREWOUND.	MANN		1
R26	063204	200K POT CERMET	BECKMANN	72P	2
R27	063204	200K " "	"	"	–
R28		NOT USED			–
R29	070137	6K420 0·1% WIREWOUND	MANN		1
R30		NOT USED			–
R31		NOT USED			–
R32	000332	3K3 5% ¼W CARBON	MULLARD	CR25	1
R33	000154	150K 5% ¼W CARBON	MULLARD	CR25	1
R34		NOT USED			–
R35	000106	10M 5% ¼W CARBON	MULLARD	CR25	–
R36	041005	10M 1% 100ppm CF.	ALLEN BRADLEY	CC	1
R37	090049	18M MATCHED PAIR	HOLCO		1 PAIR
R38		18M			–
R39		NOT USED			–
R40		NOT USED			–
R41	000473	47K 5% ¼W CARBON	MULLARD	CR25	2
R42	000624	620K " " "	"	"	1
R43	000473	47K " " "	"	"	–
R44		NOT USED			–
R45	000102	1K 5% ¼W CARBON	MULLARD	CR25	–
R46		NOT USED			–

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DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
R47	000823	82k 5% ¼W CARBON	MULLARD	CR25	1
R48	000105	1M 5% ¼W CARBON	MULLARD	CR25	3
R49		NOT USED			-
R50		NOT USED			-
R51	000105	1M 5% ¼W CARBON	MULLARD	CR25	-
R52	000104	100K " " "	"	"	-
R53	000273	27K " " "	"	"	2
R54	000104	100K " " "	"	"	-
R55	000105	1M " " "	"	"	-
R56	000824	820K " " "	"	"	1
R57	000104	100K " " "	"	"	-
R58	000273	27K " "		"	-
R59	000104	100K " "	"	"	-
R60	000123	12K " "	"	"	1
R61	000334	330K		"	1
R62		NOT USED			-
R63	000104	100k 5% ¼W CARBON	MULLARD	CR25	-
R64	000333	33K	"	"	1
R65	000272	2K7			1
R66		NOT USED			-
R67	000474	470K 5% ¼W CARBON	MULLARD	CR25	1
R68	000124	120K " " "	"	"	1
R69	000103	10K " " "	"	"	2

NOTES

SEE SHEET 2 FOR LATEST ISSUE

IBS	
ECO	
DATE	
CHKD	

DATE	14.7.80
DRAWN	IL
CHECKED	
APPROVED	
DATE	

datron ELECTRONICS LTD

TITLE: 1065 OHMS PC B ASSY

DRAWING NUMBER: 400426

SHEET 4 OF 12

JW 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No. USED Per Assy.
R70	000221	220R 5% ¼W CARBON	MULLARD	CR25	1
R71	000103	10k 5% ¼W CARBON	MULLARD	CR25	-
ANI	090017	100k x 7 2% NETWORK	BECKMAN	764-1-R100k	1

NOTES

SEE SHEET 2 FOR LATEST ISSUE

IBS	
ECO	
DATE	
CHKD	

DATE	14.7.80
DRAWN	IL
CHECKED	
APPROVED	
DATE	

datron

TITLE: 1065 OHMS PCB ASSY.

DRAWING NUMBER: 400426

SHEET 5 OF 12

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURERS PART No	No USED Per Assy
C1		NOT USED			–
C2	120026	680pF 20% 100V POLYCARB	WIMA	FKC-2 MIN	1
C3	102470	47pF 500V CER DISC	ERIE	801	2
C4	102470	47pF 500V CER DISC	ERIE	801	–
C5		NOT USED			–
C6	101103	·01μF 250V CER DISC	ERIE	801	2
C7	120022	1nSF 20% 100V POLYCARB	WIMA	FKC2 MIN	1
C8	120006	470nF 10% 160V POLYCARB	ASHCROFT	A2B471SB	2
C9	120006	470nF 10% 160V POLYCARB	ASHCROFT	A2B471SB	–
C10	110013	0·1μF 10% 250V POLYESTER	MULLARD	C280AE/P100K	2
C11		NOT USED			–
C12		NOT USED			–
C13	150022	2μ2F 20% 35V DIP. TANT	UNION CARBIDE	K2R2E35	1
C14		NOT USED			–
C15	102100	10pF 500V CER DISC	ERIE	801	2
C16	102100	10pF " " "	"	"	–
C17	102102	1nF " " "	"		1
C18	120021	0·47μF 10% 63V POLYCARB	ASHCROFT	A2B471IB	1
C19	150014	680nF 20% 35V DIP TANT	UNION CARBIDE	KR68E35	1
C20		NOT USED			–
C21	150020	10μF 20% 25V DIP TANT	UNION CARBIDE	K10E25	2
C22	101103	·01μF 250V CER DISC	ERIE	801	–
C23	150020	10μF 20% 25V DIP TANT	UNION CARBIDE	K10E25	–

NOTES

SEE SHEET 2 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE 14.7.80 | DRAWN IL | CHECKED | APPROVED | DATE

datron ELECTRONICS LTD

TITLE 1065 OHMS PCB ASSY

DRAWING NUMBER 400426 | SHEET 6 OF 12

JW 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
C24	102101	100pf 10% 500V Cer Disc	I.T.T	CD10	3
C25	102101	100pf " " " "	"	"	–
C26	102101	100pF " " " "	"	"	–
C27	110013	100nF 20% 250v POLYESTER	MULLARD	C280AE P100K	–
D1		NOT USED			–
D2	213002	5V1 5W ZENER	MOTOROLA	1N5338	2
D3		NOT USED			–
D4		NOT USED			–
D5		NOT USED			–
D6		NOT USED			–
D7		NOT USED			–
D8		NOT USED			–
D9		NOT USED			–
D10	213002	5V1 5W ZENER	MOTOROLA	1N5338	–
D11		NOT USED			–
D12		NOT USED			–
D13	200005	30mA 25v GP. Ge DIODE	NEWMARKET	OA47	1
D14		NOT USED			–
D15	200008	Si Low LEAKAGE	FAIRCHILD	1N458A	1
D16		NOT USED			–
D17		NOT USED			–

NOTES

SEE SHEET 7 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE 14.7.80 | DRAWN IL | CHECKED | APPROVED | DATE

datron ELECTRONICS LTD

TITLE 1065 OHMS PCB ASSY

DRAWING NUMBER 400426 | SHEET 7 OF 12

JW 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
D18	200001	Si G P	FAIRCHILD	IN4148	5
D19		NOT USED			–
D20		NOT USED			–
D21	200001	Si G.P.	FAIRCHILD	IN4148	–
D22	200001	Si "	"	"	–
D23	200001	Si "	"	"	–
D24		NOT USED			–
D25		NOT USED			–
D26	200001	Si. GP.	FAIRCHILD	IN4148	–
Q1		NOT USED			–
Q2		NOT USED			–
Q3		NOT USED			–
Q4		NOT USED			–
Q5	230002	N-CHAN J FET	SILICONIX	U1994E	5
Q6		NOT USED			–
Q7		NOT USED			–
Q8	230002	N-CHAN J FET	SILICONIX	U1994E	–
Q9	230002	" "	"	"	–
Q10	240017	Si NPN SUPERMATCH PAIR	NATIONAL	LM394	1
Q11		NOT USED			

NOTES

SEE SHEET 2 FOR LATEST ISSUE

DATE	14.7.80	datron ELECTRONICS LTD	
DRAWN	IL	TITLE	1065 OHMS PCB ASSY
CHECKED		DRAWING NUMBER	400426
APPROVED		SHEET OF	8 12
DATE			

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
Q12		NOT USED			–
Q13		NOT USED			–
Q14		NOT USED			–
Q15		NOT USED			–
Q16		NOT USED			–
Q17	240001	Si NPN	NATIONAL	BC184	2
Q18	240001	Si NPN	NATIONAL	BC184	–
Q19		NOT USED			–
Q20	230002	N-CHAN J FET	SILICONIX	U1994E	–
Q21	230002	N-CHAN J FET.	SILICONIX	U1994E	–
Q22		NOT USED			–
Q23		NOT USED			–
Q24		NOT USED			–
Q25		NOT USED			–

NOTES

SEE SHEET 2 FOR LATEST ISSUE

DATE	14.7.80	datron	
DRAWN	IL	TITLE	1065 OHMS PCB ASSY
CHECKED			
APPROVED		DRAWING NUMBER	400426
DATE		SHEET	9 12

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No	No USED Per Assy
M1	280022	QUAD BILATERIAL SWITCH	MOTOROLA	MC 14016 BCP	2
M2	280022	" " "	"		—
M3	260022	OP AMP	NATIONAL	LF 355	1
M4	260027	OP AMP	FAIRCHILD	UA 714	1
M5	280025	QUAD ANALOGUE SWITCH	MOTOROLA	MC 14066 BCP	1
M6	280072	M'STABLE/ASTABLE M'VIBR	R C A	CD 4047 AE	1
M7	280015	QUAD LATCH	MOTOROLA	MC 14076 BCP	2
M8	280015	" "	"	"	—
M9	280011	DUAL D FLIP FLOP	MOTOROLA	MC 14013 BCP	1

NOTES

SEE SHEET 2 FOR LATEST ISSUE

| ISS | 1 | | |

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
					"
					"
	G11004	SCREW M3 x 6mm STEEL POZIPAN ZINC PLATED . GKN			1
	G13005	WASHER M3 INT/SHAKEPROOF	GKN DISTRIBUTORS	ZINC PLATED	2
	G15002	NUT M3 FULL HEX STEEL		ZINC PLATED	1
	G15005	NUT 3-48 UNC FULL HEX	STEEL	" "	1
	G17010	NYLATCH PLUNGER HN3P	ORDER FROM C. J. FOX & SONS.	HN3P-32-4-1	4
	G17011	NYLATCH GROMMET HN3G		HN3G-32-1	4
	G20003	SOLDER PCB TERMINAL LUG	HARWIN	H2105A	8
	G30024	STANDARD STEATITE INSUL BEAD	PARK ROYAL PORCELAIN Co	TYPE No 2 (16 SWG)	8

NOTES

SEE SHEET 2 FOR LATEST ISSUE

RIS											
E C O											
DATE											
CHKD											

DATE	14.7.80
DRAWN	IL
CHECKED	
APPROVED	
DATE	

datron ELECTRONICS LTD

TITLE: 1065 OHMS PCB ASSY

DRAWING NUMBER: 400426

SHEET 12 OF 12

J.W. 1164

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
R1	000104	100k 5% ¼W CARBON	MULLARD	CR25	3
R2	000103	10k 5% ¼W CARBON	MULLARD	CR25	1
R3	000104	100k 5% ¼W CARBON	MULLARD	CR25	–
R4	000104	100k 5% ¼W CARBON	MULLARD	CR25	–
R5	000102	1K 5% ¼W CARBON	MULLARD	CR25	1
R6	000561	560R 5% ¼W CARBON	MULLARD	CR25	1
AN1	090017	100K×7 2% NETWORK	BECKMAN	764-1-R100K	1
C1	150015	10μF 20% 35v DIP. TANT.	UNION CARBIDE	K10E35	4
C2	101103	10nF 25% 250v CER. DISC	ITT	CD10	2
C3	150015	10μF 20% 35v DIP. TANT.	UNION CARBIDE	K10E35	–
C4	150015	10μF 20% 35v DIP. TANT.	UNION CARBIDE	K10E35	–
C5	150016	1μF 20% 35V DIP. TANT.	UNION CARBIDE	K1R0E35	1
C6	150012	100nF 20% 35v DIP. TANT	UNION CARBIDE	KR10E35	1
C7	150015	10μF 20% 35v DIP. TANT.	UNION CARBIDE	K10E35	–
C8	101103	10nF 25% 250V CER. DISC	ITT	CD10	–
C9	102681	680pF 10% 500v CER DISC	ITT	CD10	1
M1	280086	BI-DIRECTIONAL BUS TRANSCEIVER	MOTOROLA	MC3447P	2
M2	280086	BI DIRECTIONAL BUS TRANSCEIVER	MOTOROLA	MC3447P	–

NOTES

SEE SHEET 2 FOR LATEST ISSUE

ISS	A	B	1	2	3	4	5	6	7
ECO	—	—	RELEASED	1196	1217	1253	1297	1347	1448
DATE		26.11.80	18.12.80	25.2.81	18.4.81	3.12.81	25.3.82	7.7.82	15.2.83
CHKD		MD		MD	M	MD	MD	MD	MD

DATE 19.9.80
DRAWN
CHECKED D. King
APPROVED
DATE

datron ELECTRONICS LTD

TITLE 1061/1065/1071/1081 IEEE PCB. ASSY.

DRAWING NUMBER 400427 SHEET 2 OF 4

JW 1164

DESIGNATOR	DATRON PART No	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy
M3		FITTED AT FINAL ASSY.			–
M4		NOT USED			–
M5		NOT USED			–
M6	280024	TRI-STATE HEX. BUFFER	MOTOROLA	MC14503BCP	1
M7		NOT USED			–
M8	270050	HEX. INVERTER LS	NATIONAL	DM74LS04N	1
M9	280064	GPIA	MOTOROLA	MC68488P	1
M10	280068	DUAL PREC. M'STABLE M'VIBR.	MOTOROLA	MC14538BCP	1
M11	270055	DUAL 4 I/P NAND LS	NATIONAL	DM74LS20N	2
M12	270055	DUAL 4 I/P NAND LS	NATIONAL	DM74LS20N	–
M13	270051	DUAL 4 I/P AND LS	NATIONAL	DM74LS21N	1
J1	605102	24 WAY DIL. SOCKET GOLD	CA	CA-24-S 105D	1
J2	605002	16 WAY DIL. LOW PROFILE SKT.	JERMYN OR ANTIFERENCE	A23-2001/Y OR ICN-63-S3	1
J3	573120/C	24 WAY AP/3M CABLE ASSY	DATRON		1
J4	605051	4 WAY POLARISED SOCKET	MOLEX	(22-01-2045) 6471-4-1	1
	400379/1	WIRE/TERMINAL ASSY			2
	410165-2	PCB			1
	540002	22 SWG BTC WIRE			A/R
	590004	SLEEVE - PTFE	HELLERMANN ELECTRIC	FE10	A/R
	605060	14 WAY DIL. SOCKET	ASTRALUX OR JERMYN	ICL-143-S8T	4

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS														
ECO														
DATE														
CHKD														

DATE
DRAWN
CHECKED
APPROVED
DATE

datron ELECTRONICS LTD

TITLE 1061/1065/1071/1081 IEEE PCB. ASSY.

DRAWING NUMBER 400427 SHEET 3 OF 4

DESIGNATOR	DATRON PART No.	DESCRIPTION	PRINCIPAL MANUFACTURER	MANUFACTURER'S PART No.	No. USED Per Assy.
	605061	16WAY DIL. SOCKET	ASTRALUX OR VERMYN	ICL-163-S6T	2
	605050	40 PIN DIL. LOW PROF. SKT	AUGAT	340-AG39D	1
	605063	22 PIN DIL SOCKET	AUGAT	322-AG39D	2
	605064	24 PIN DIL SOCKET	AUGAT	324-AG39D	3
	605056	CRIMP TERMINAL	MOLEX	4809-TL	2
	606005	CLIP FOR 605002	ANTIFERENCE	RC-74	1
	617010	NYLATCH PLUNGER HN3P	ORDER FROM C.J. FOX & SONS	HN3P-32-4-1	3
	617011	NYLATCH GROMMET HN3G	ORDER FROM C.J. FOX & SONS	HN3G-32-1	3
	620007	TEST POINT TERMINAL	MICROVAR	C30	5

NOTES.

SEE SHEET 2 FOR LATEST ISSUE

ISS													
ECO													
DATE													
CHKD													

DATE

DRAWN

CHECKED

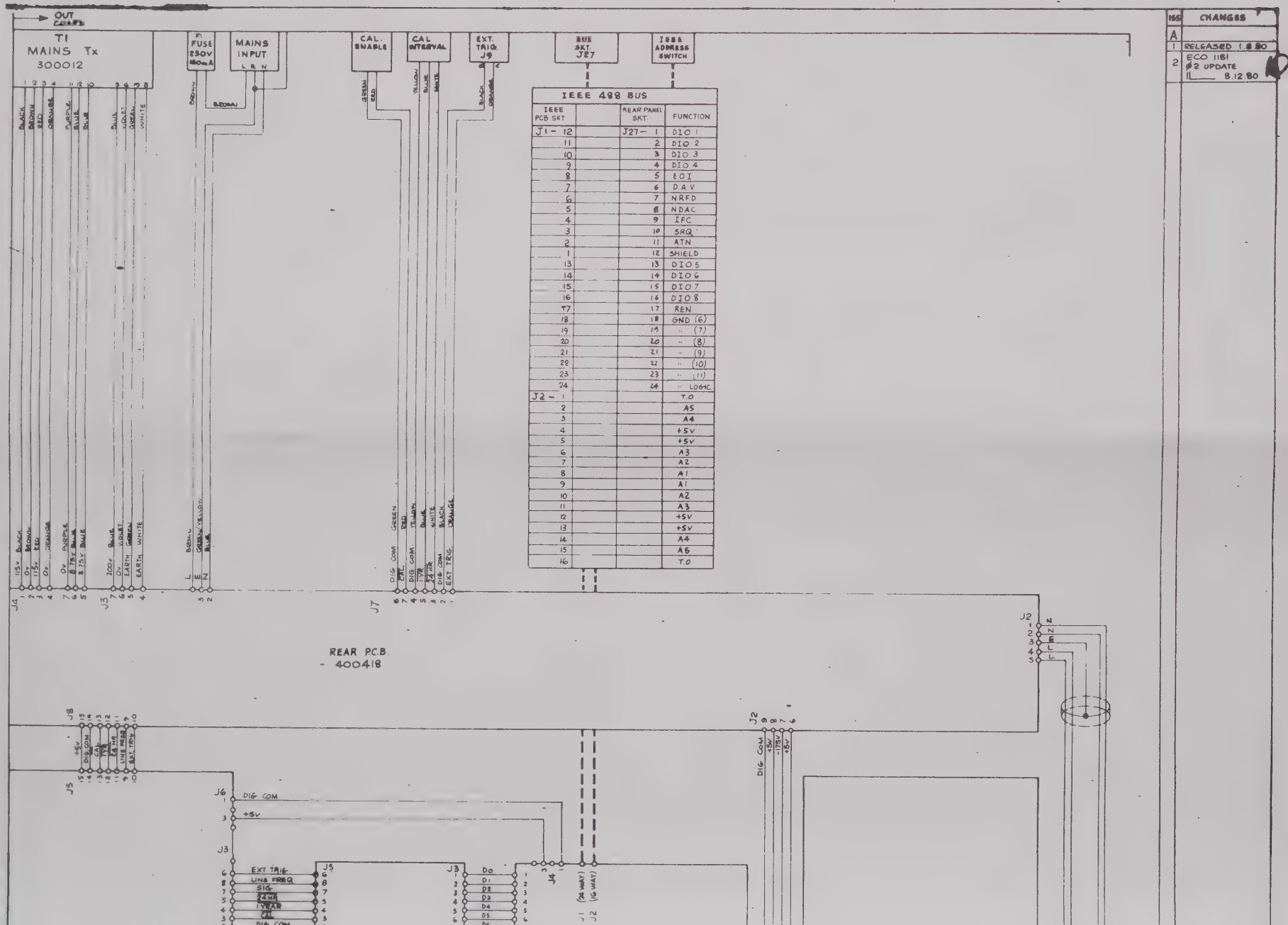
APPROVED

DATE

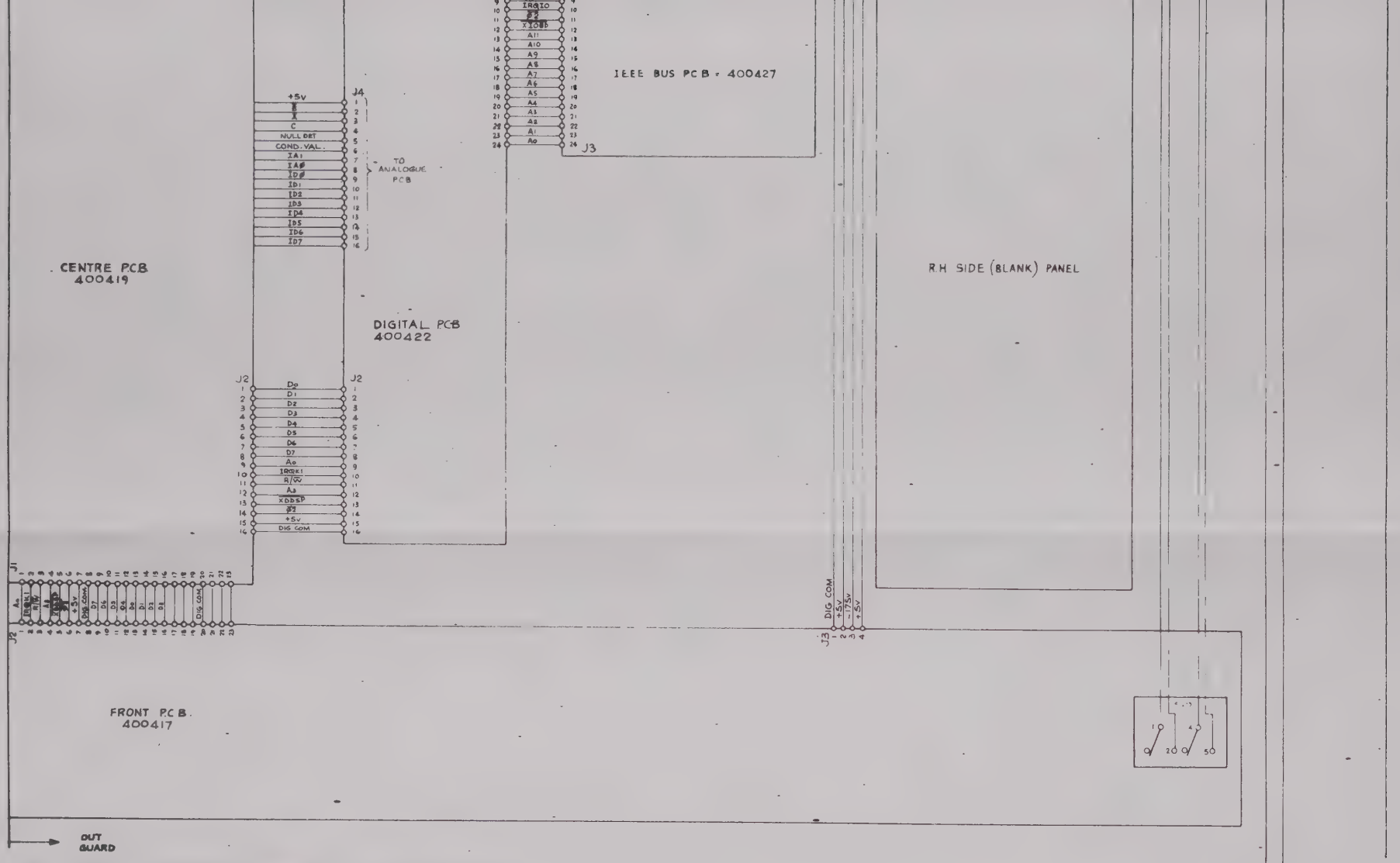
datron

TITLE 1061/1063/1071/1073 IEEE. PCB. ASSY.

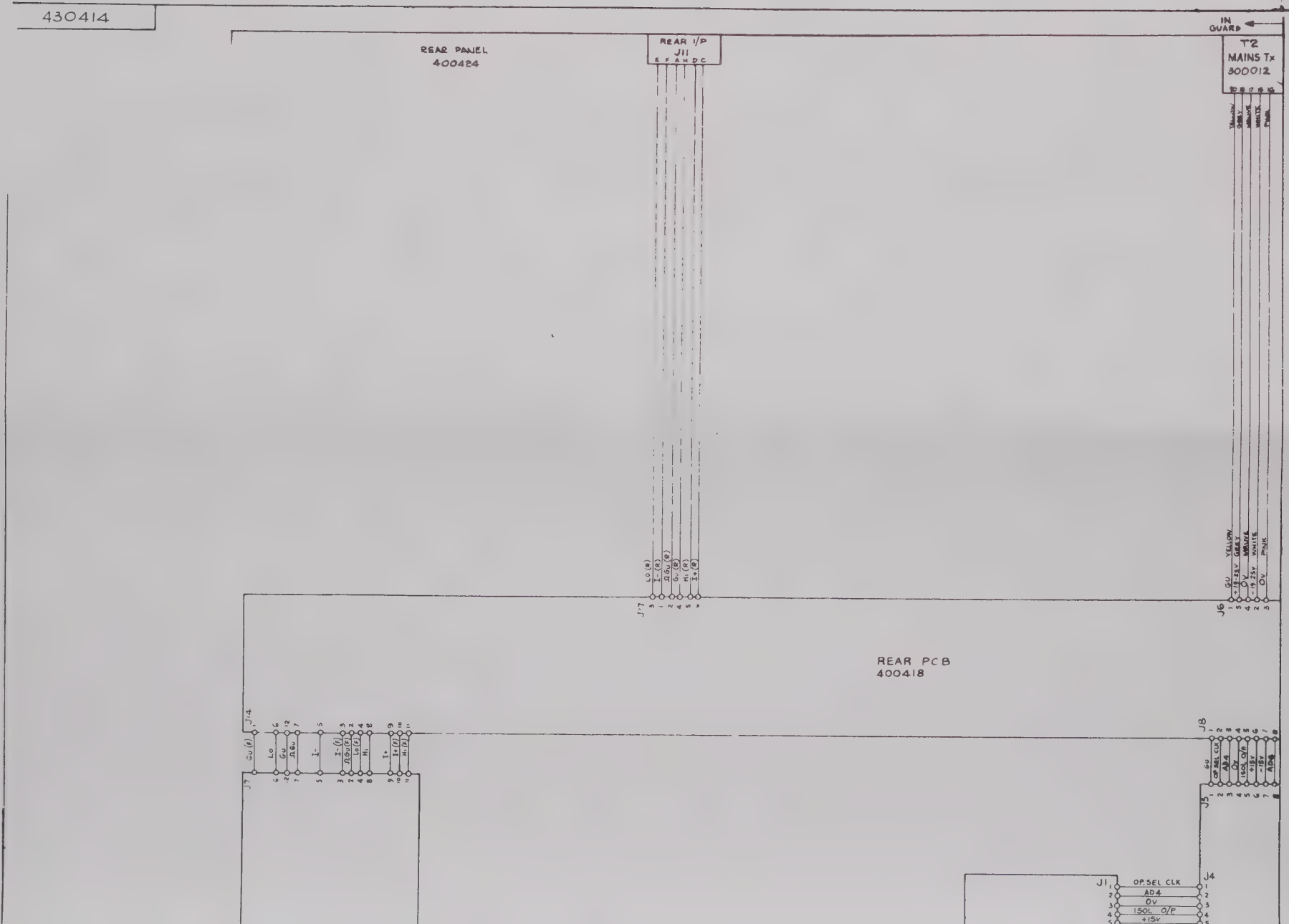
DRAWING NUMBER 400427 SHEET 4 OF 4

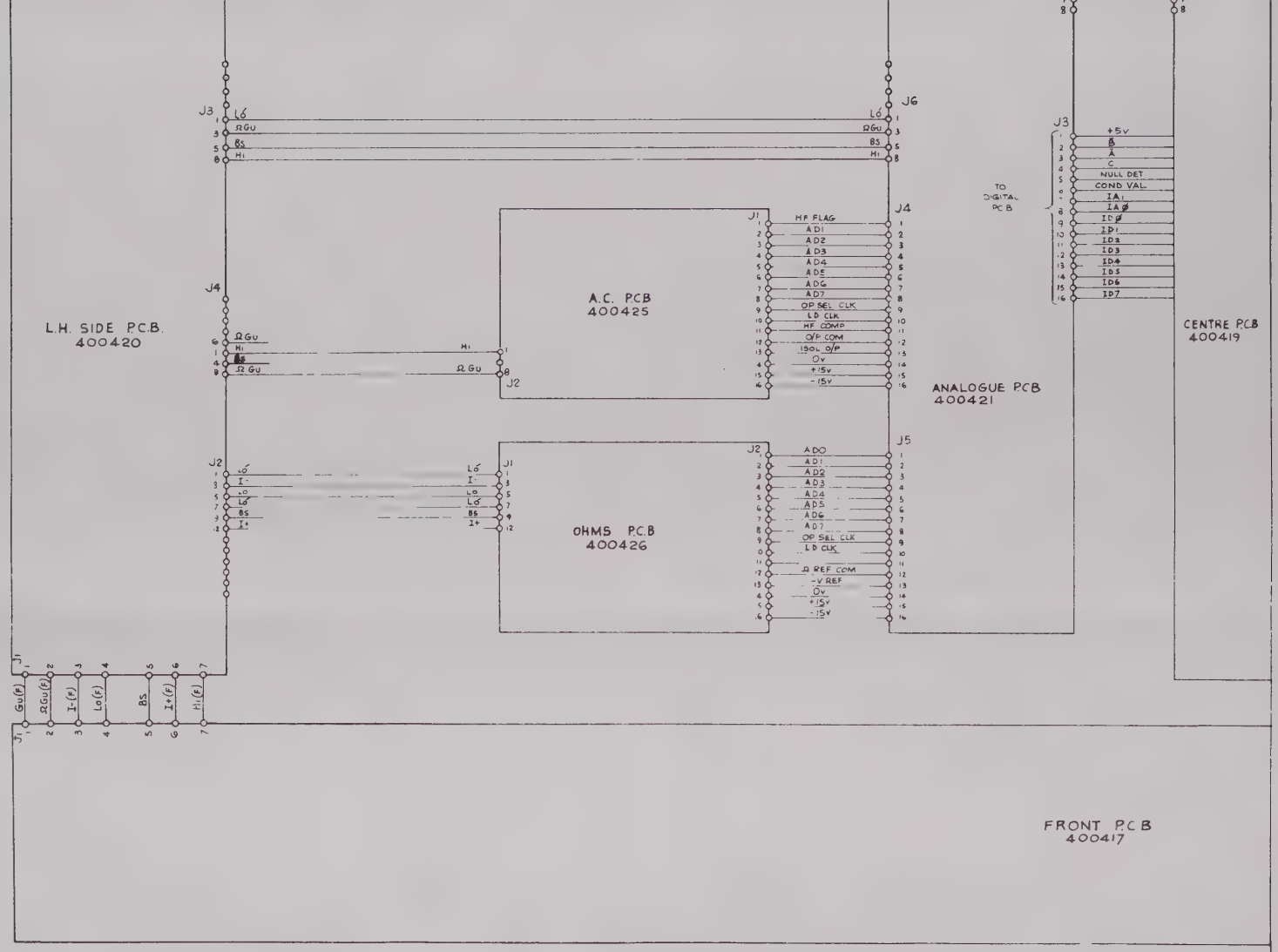


ISS	CHANGES
A	
1	RELEASED 1.8.80
2	ECO 1181 #2 UPDATE 8.12.80



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± °	MATERIAL	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE
TRACED	APPROVED	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64			A1
DATE	DATE	SCALE NOT TO BE SCALED	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm UNLESS OTHERWISE STATED	FINISH	TITLE 1065 INTERCONNECTION DIAGRAM	DRAWING No 430414 SHEET 1 OF 1


430414
REAR PANEL
400424
REAR I/P
J11
E F A K D C
IN
GUARD
T2
MAINS Tx
300012
YELLOW
GREY
VIOLET
WHITE
PINK
J17
LO (R)
I- (R)
ΔGu (R)
Gu (R)
HI (R)
I+ (R)
J6
GU
+18.5V
0V
-18.5V
0V
REAR PCB
400418
J14
J7
Gu (R)
Lo
Gu
ΔGu
I-
I- (R)
ΔGu (R)
Lo (R)
Hi
I+
I+ (R)
Hi (R)
J8
GU
OP SEL CLK
AD4
0V
ISOL O/P
-18V
+18V
AD4
J5
J1
J4
OP.SEL CLK
AD4
0V
ISOL O/P
+15V



ISS	1	2						
ECO	--	1191						
DATE	1.8.80	8.12.80						
CHKD	DS	[redacted]						

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A

1065 INTERCONNECTION DIAGRAM

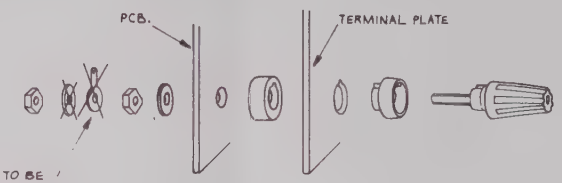
DRAWING No. 430414

DRAWING No 400417

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



SOLDER TAG NOT TO BE FITTED — RETURN THE TAGS TO STORES. (PART Nº 613009)

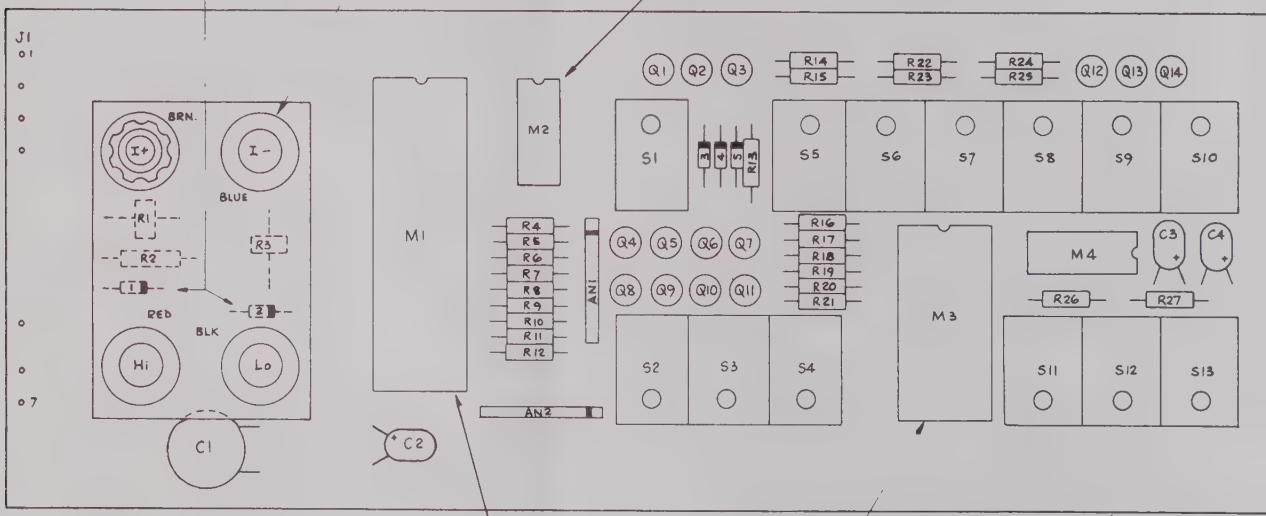
N.B NO COMPONENTS TO STAND HIGHER THAN 7·5 (EXCEPT SWITCHES & TERMINALS)

N.B. SLEEVE BODY OF D1 & D2 (LIGHT SENSITIVE!) WITH SLEEVE 590001 — 2 OFF BEFORE SOLDERING.

ASSEMBLE 4 TERMINALS TO TERMINAL PLATE (PART Nº 450295 AND PCB, AS SHOWN ABOVE. TERMINAL COLOURS MUST BE AS INDICATED BELOW.

MOUNT M2 & M4 INTO 14 WAY DIL SOCKET - PART Nº 605060, 2 OFF

8½ DIGI

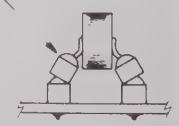


MOUNT M1 ON 40 PIN DIL SOCKET - PART Nº 605098

MOUNT M3 ON 24 PIN DIL SOCKET SOCKET — PART Nº 605097

PCB 410149-3A

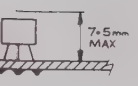
RESISTORS R1-R3 & DIODES D1-D2 TO BE MOUNTED ON UNDERSIDE OF BOARD R1 & R3 TO BE MOUNTED ON INSULATING BEADS — 2 PER LEG — AS SHOWN, BEFORE SOLDERING (PART Nº OF BEADS 630024 8 OFF)

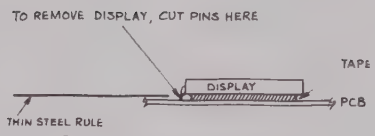


	CHECKED	DIMENSIONS IN	TOLERANCES
TRACED	APPROVED	MILLIMETRE	NON-DIMENSIONS DECIMAL TO 3 PLACES ± DECIMAL TO 2 PLACES ± FRACTIONAL ± METRIC DIMENSIONS DECIMAL TO 3 PLACES ± DECIMAL TO 1 PLACE ± WHOLE DIMENSIONS ± UNLESS OTHERWISE STATED
DATE 17.9.80	DATE	SCALE 2:1 NOT TO BE SCALED	

ALL BURRS TO BE REMOVED

A	
3	ECO 1181 Ø 2 UPDATE 18 12 80
4	ECO 1222, 1225 AND 1226. PCB ISSUE 3A. PARTS LIST CHANGES. M1 AND M3 MOUNTED IN SOCKETS.



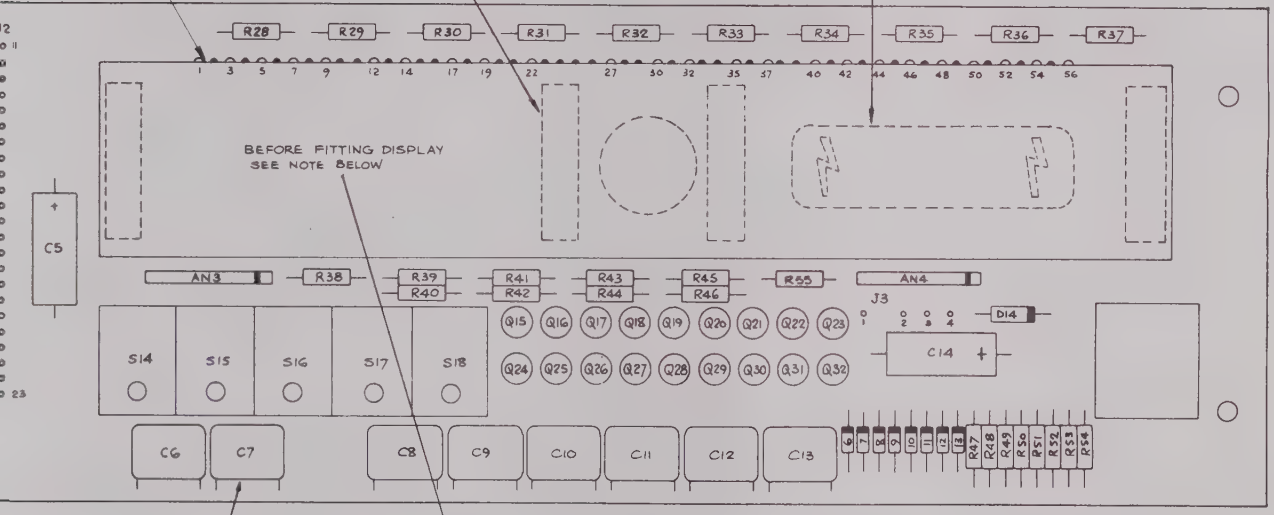


SLIDE THE RULE BETWEEN THE DISPLAY AND PCB. TO SPLIT FOAM TAPE

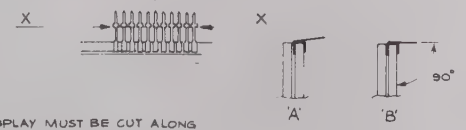
DISPLAY TO HAVE 4 PIECES (25mm LONG) OF PRESSURE SENSITIVE TAPE - PART Nº 630029, STUCK TO REVERSE OF DISPLAY IN POSITIONS SHOWN. LINE-UP & PRESS DISPLAY FIRMLY INTO PLACE, THEN SOLDER THE 24 PINS ONLY, WHICH ARE SHOWN BELOW. (THERE ARE SOLDER PADS ONLY FOR THESE PINS)

FIT WARNING LABEL 420080-1 IN APPROX. POSITION SHOWN, ON CIRCUIT SIDE OF PCB NEAR MAINS AND DISPLAY CONNECTIONS

DISPLAY (PART Nº 800017)



APACITORS TO BE LAID DOWN WHERE SLE ; LEADS TO BE BENT AT RIGHT E THEN INSERTED INTO PCB., THIS KEEP CAPACITORS AS LOW AS POSSIBLE.



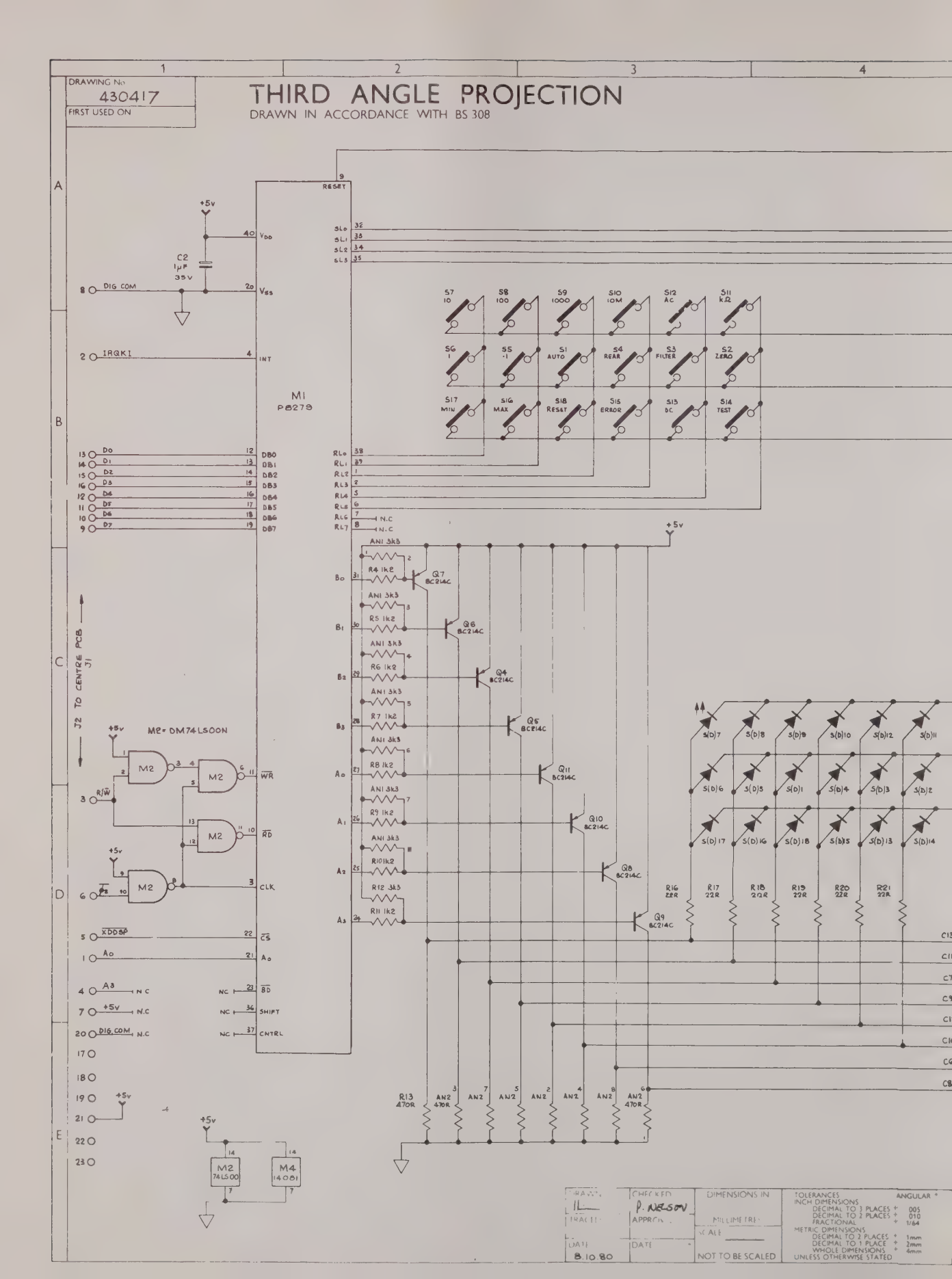
PINS OF THE DISPLAY MUST BE CUT ALONG THE LINE SHOWN 'X-X'. THEN THE PINS MUST BE BENT FROM POSITION 'A' TO POSITION 'B' BEFORE INSERTION INTO PCB

MATERIAL	datron ELECTRONICS LTD. NORWICH		DRAWING SIZE A1
FINISH	1065 FRONT PCB. ASSY	DRAWING No 400417	SHEET 1 OF 9

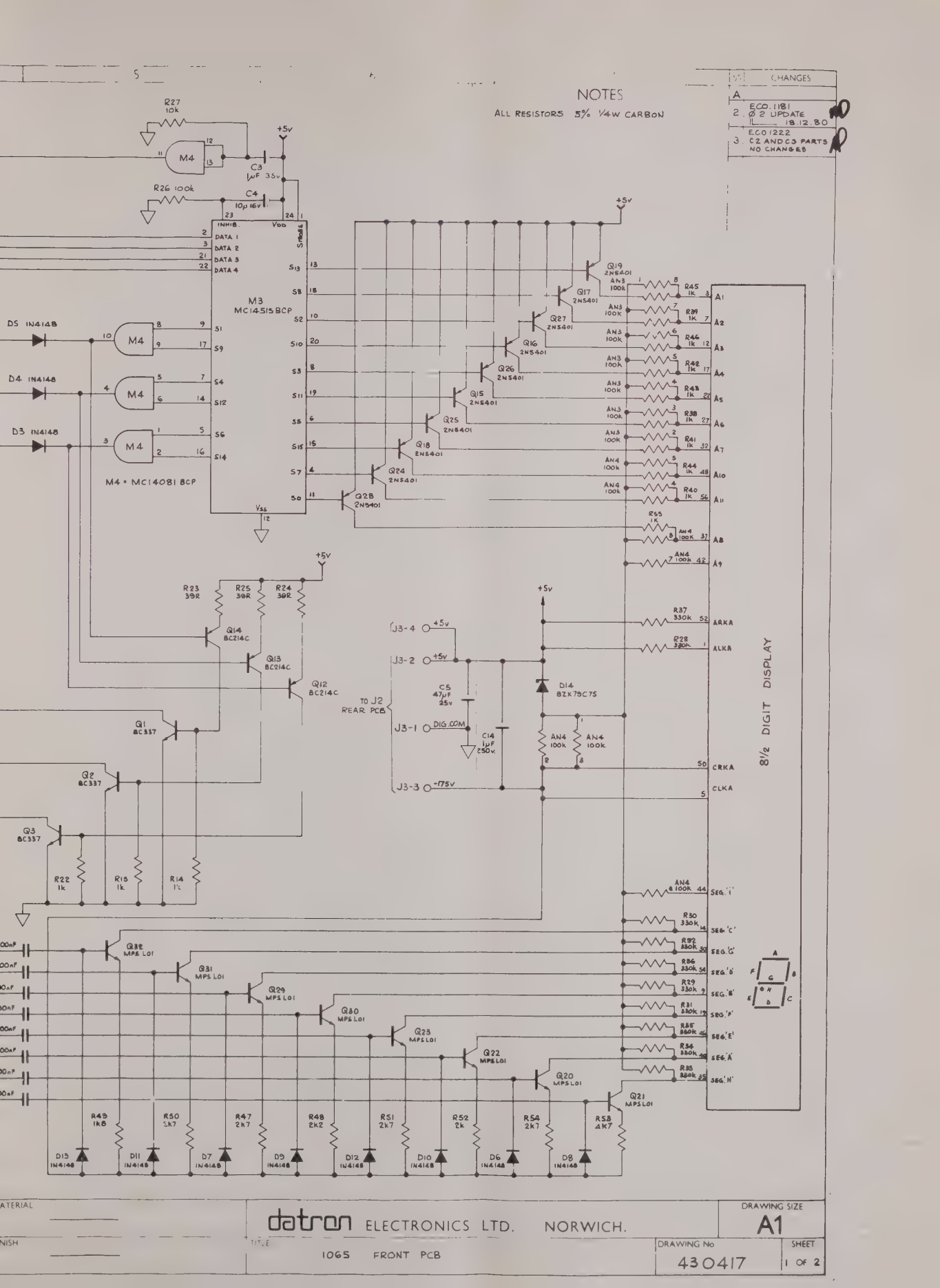
DRAWING No
430417
FIRST USED ON

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	ANGULAR °
IL	P. NELSON	MILLIMETRES	INCH DIMENSIONS	
TRACED	APPROD	SCALE	DECIMAL TO 3 PLACES ±	.005
DATE	DATE	NOT TO BE SCALED	DECIMAL TO 2 PLACES ±	.010
8.10.80			FRACTIONAL ±	1/64
			METRIC DIMENSIONS	
			DECIMAL TO 2 PLACES ±	1mm
			DECIMAL TO 1 PLACE ±	2mm
			WHOLE DIMENSIONS ±	4mm
			UNLESS OTHERWISE STATED	


NOTES
ALL RESISTORS 5% ¼W CARBON
CHANGES
A
2 ECO 1181 Ø2 UPDATE 18.12.80
3 ECO 1222 C2 AND C3 PARTS NO CHANGES
M3 MC14515BCP
M4 = MC14081 BCP
8½ DIGIT DISPLAY
TO J2 REAR PCB
J3-4 +5v
J3-2 +5v
J3-1 DIG.COM
J3-3 -175v
datron ELECTRONICS LTD. NORWICH.
1065 FRONT PCB
DRAWING SIZE A1
DRAWING No 430417
SHEET 1 OF 2

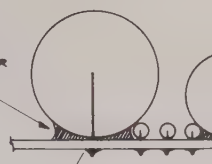
DRAWING No. 400418

FIRST USED ON

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

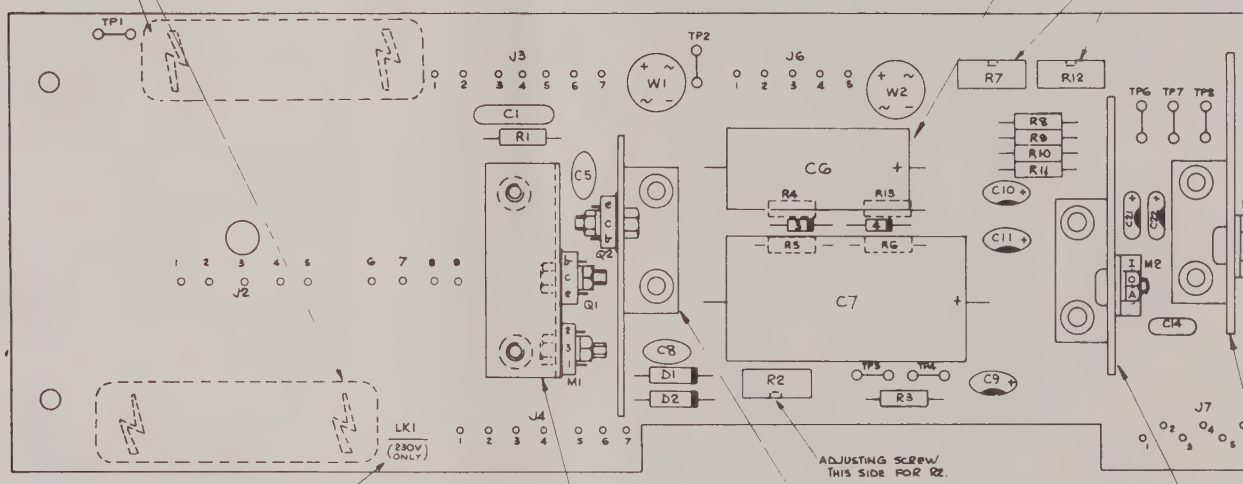
THE 4 LARGE CAPACITORS C6,C7, C13+C15 ARE TO BE BEDDED INTO SILICONE RUBBER COMPOUND PART Nº 900004 BEFORE SOLDERING THIS SHOULD FINISH UP AS ABOVE DRAWING



TYPICAL TEST POINT LOOP

FIT WARNING LABEL 420080-1 IN APPROX POSITIONS SHOWN ON TRACK SIDE OF PCB IN MAINS AREA

ADJUSTING SCREW - TH FOR R7 + R

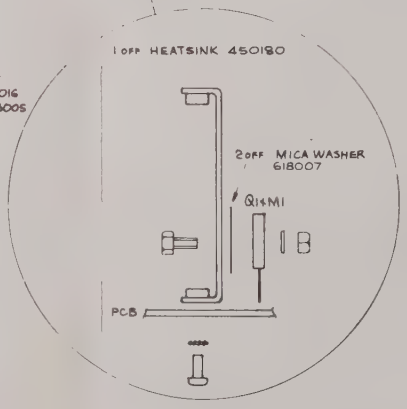


ADJUSTING SCREW THIS SIDE FOR R2.

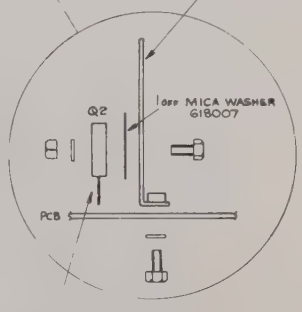
LK1 UNSLEEVED

THIS HEATSINK HELD TO PCB BY
STEEL M3X8 SCREW 2 OFF 611016
STEEL M3 SHAKEPROOF 2 OFF 613005

Q1 + M1 HELD TO HEATSINK WITH
NYLON M3X8 SCREW 2 OFF 611037
NYLON M3 WASHER 2 OFF 613017
NYLON M3 NUT 2 OFF 615008

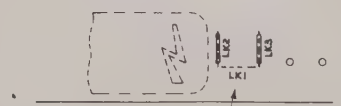


THIS HEATSINK 450183 HELD TO PCB BY 2 OFF NYLON SCREW M3X8 611037
2 OFF NYLON WASHER M3. 613017



Q2 HELD TO HEATSINK WITH
NYLON M3X8 SCREW 611037
NYLON M3 WASHER 613017
NYLON M3 NUT 615008

FOR 115V OPERATION ONLY, REMOVE LK1, FIT LK2 & LK3



LK2 & LK3 TO BE SLEEVED USING SLEEVE 590004.

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES
IL	D King	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES DECIMAL TO 2 PLACES FRACTIONAL
TRACED	APPROVED	SCALE 2:1	METRIC DIMENSIONS DECIMAL TO 2 PLACES DECIMAL TO 1 PLACE WHOLE DIMENSIONS
DATE 11. 9. 80	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED

5	6	7

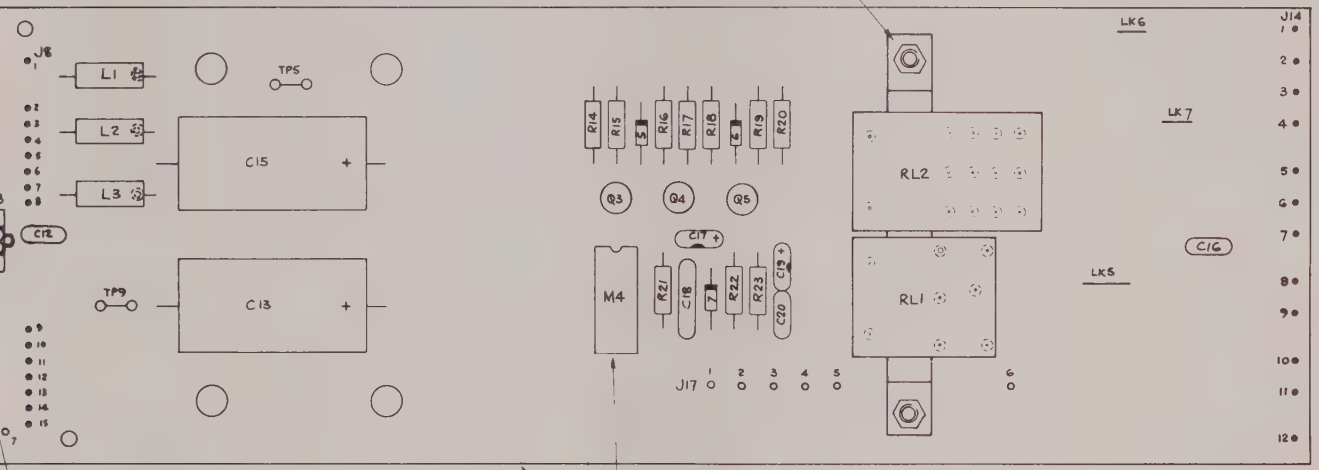
ALL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
C	
D	
1	RELEASED 18 12 80

SIDE

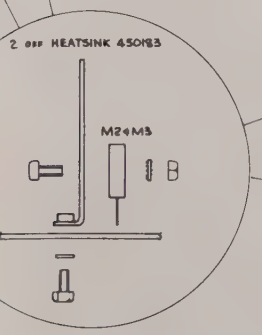
BRACKET FOR MTG. RL1 & RL2
SECURED TO PCB USING
2 OFF SCREW M3 x 8 611016
2 OFF SHAKEPROOF M3 613005
2 OFF NUT M3 615002



MOUNT M4 ON 14-WAY DIL SOCKET 605037

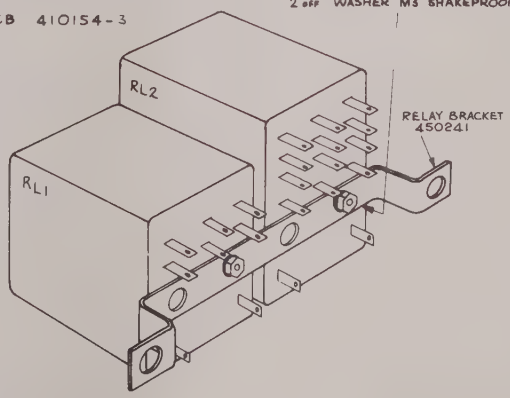
PCB 410154-3

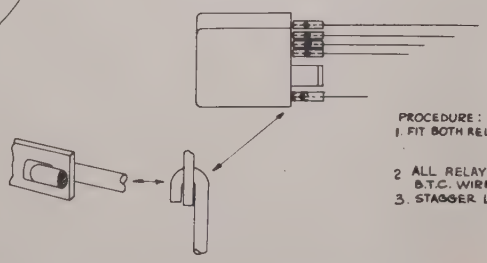
SECURE RL1 & RL2 TO BRACKET WITH
2 OFF NUT BBA 615001
2 OFF WASHER M3 SHAKEPROOF 613005



THESE 2 HEATSINKS HELD TO PCB WITH
2 OFF NYLON SCREW M3 x 8 611037
2 OFF NYLON WASHER M3 613017

M2 & M3 HELD TO HEATSINK WITH
STEEL SCREW M3 x 8 611016
STEEL SHAKEPROOF M8 613005
STEEL NUT 615002





PROCEDURE :
1. FIT BOTH RELAYS TO BRACKET (AS ABOVE)

2 ALL RELAY CONTACTS ARE TO HAVE APPROXIMATELY 60mm OF 22 SWG B.T.C. WIRE - PART Nº 540002, & SLEEVE EACH WITH 1/2 PIECE OF 590001
3. STAGGER LENGTHS OF B.T.C. WIRE TO ASSIST FITTING TO PCB.

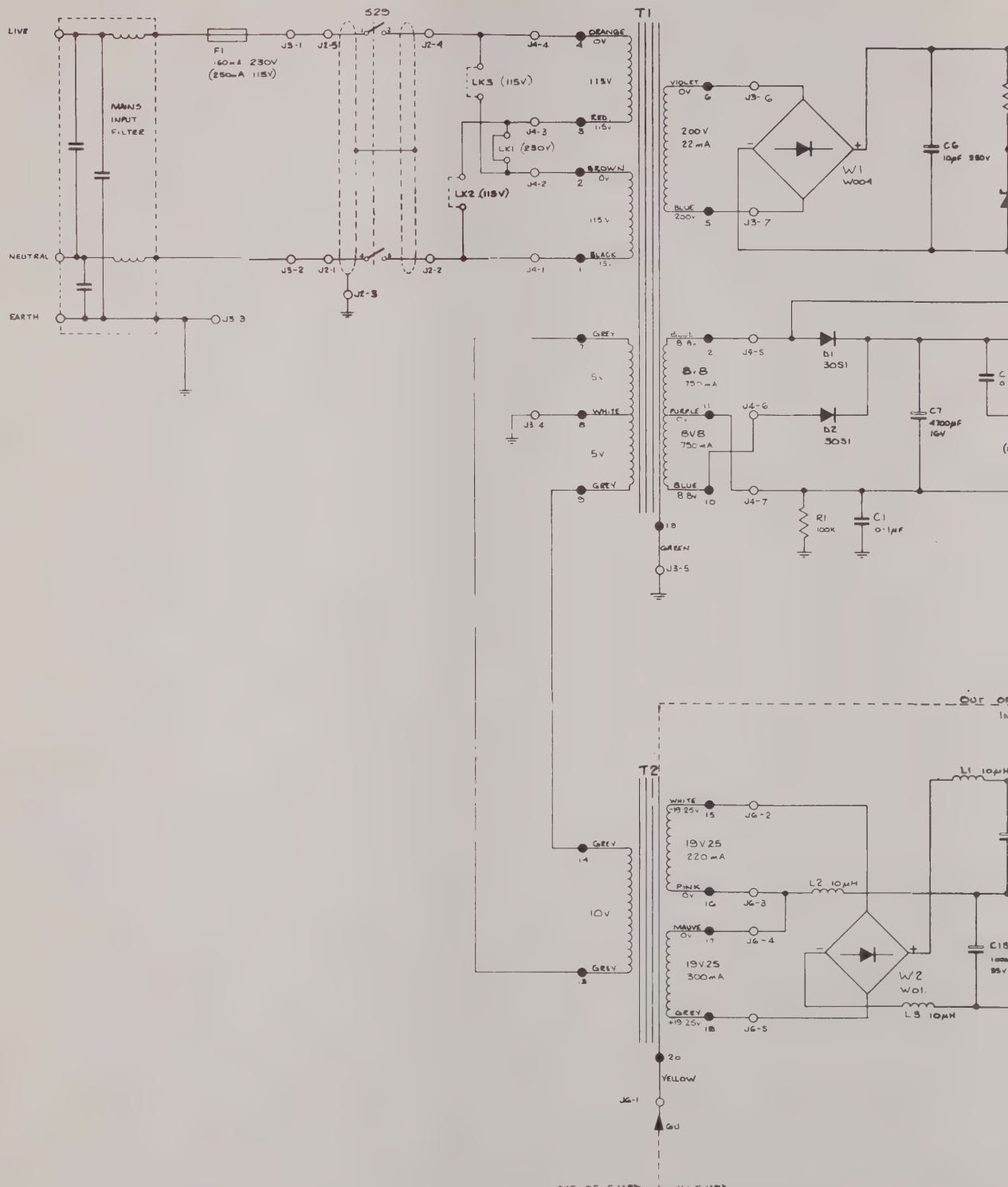
ANGULAR +/-	MATERIAL	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE
.005 .010 1/64			A1
1mm 2mm 4mm	FINISH	TITLE: REAR PCB ASSEMBLY 1065	DRAWING No. 400418 / SHEET 1 OF 7

DRAWING No. 430418

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	ANGULAR
IL	D. King	MILLIMETRES	INCH DIMENSIONS	
TRACED	APPROVED	SCALE	DECIMAL TO 3 PLACES ± .005	
D. King		NOT TO BE SCALED	DECIMAL TO 2 PLACES ± .010	
DATE	DATE		FRACTIONAL ± 1/64	
9.9.80			METRIC DIMENSIONS	
			DECIMAL TO 2 PLACES ± 1mm	
			DECIMAL TO 1 PLACE ± 2mm	
			WHOLE DIMENSIONS ± 4mm	
			UNLESS OTHERWISE STATED	

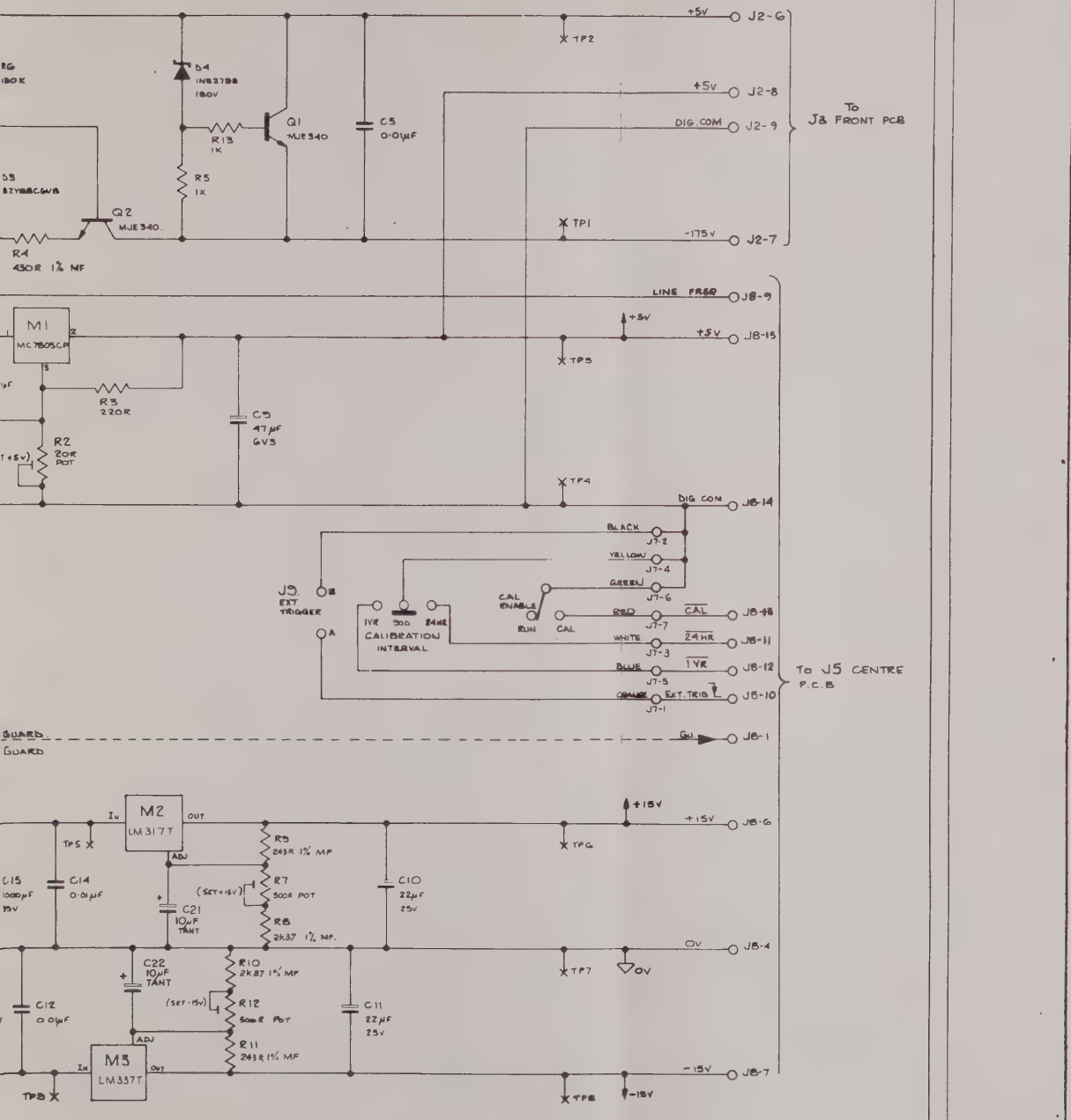
5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

1. T1, T2, MAINS INPUT FILTER, F1, EXT TRIG. , ERROR SELECT & CAL ENABLE. ARE ALL FITTED ON THE REAR PANEL ASSY 400308, BUT INCLUDED ON THIS CIRCUIT DIAGRAM

ISS.	CHANGES
A	
B	
1	RELEASED 18 12 80

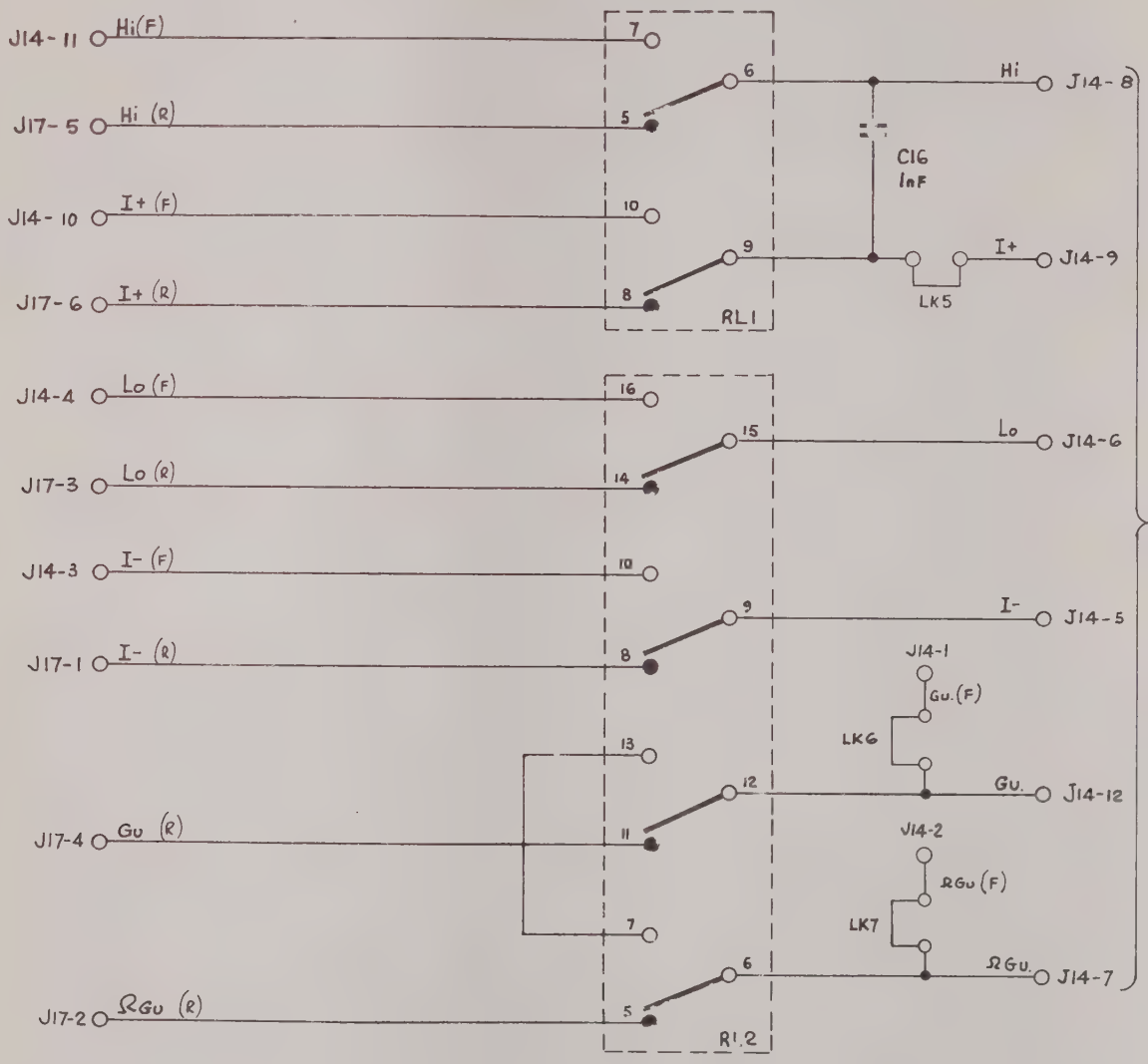


MATERIAL		DRAWING SIZE
FINISH	datron ELECTRONICS LTD. NORWICH.	A1
	TITLE: REAR PCB (INCLUDING REAR PANEL) CIRCUIT DIAGRAM 1065	DRAWING No: 430418 — SHEET: 1 OF 2

DRAWING No.
430418
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



SIGNALS TO J17 FROM REAR INPUT SOCKET J11.

SIGNALS TO J14 FROM L.H. PCB J7.

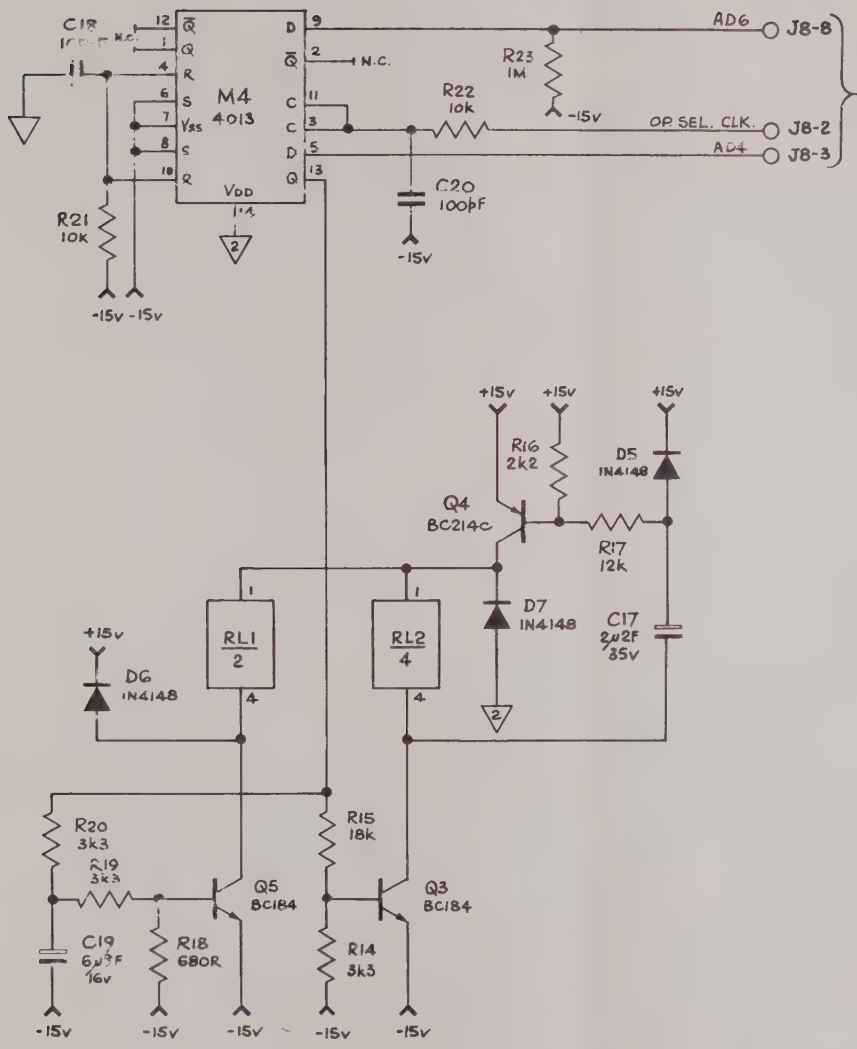
DRAWN IL	DATE 20.10.80	DIMENSIONS IN MILLIMETRES	METRIC DIMENSIONS ANGULAR ± ½° DECIMAL TO 2 PLACES ± ·1mm DECIMAL TO 1 PLACE ± ·2mm WHOLE DIMENSIONS ± ·4mm UNLESS OTHERWISE STATED	MATERIAL
CHKD. D. King.	DATE 3·12·80	SCALE NOT TO BE SCALED		FINISH
APPD.	DATE			

4 | 5 | 6

L BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
A	
B	
1	RELEASED 18.12.80



J7
H. PCB

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE
A2

TITLE
REAR PCB. (INCL. REAR INPUT) CIRCUIT.

DRAWING No.
430418

SHEET
2 OF 2

DRAWING No	
400419	
FIRST USED ON	1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

IMPORTANT

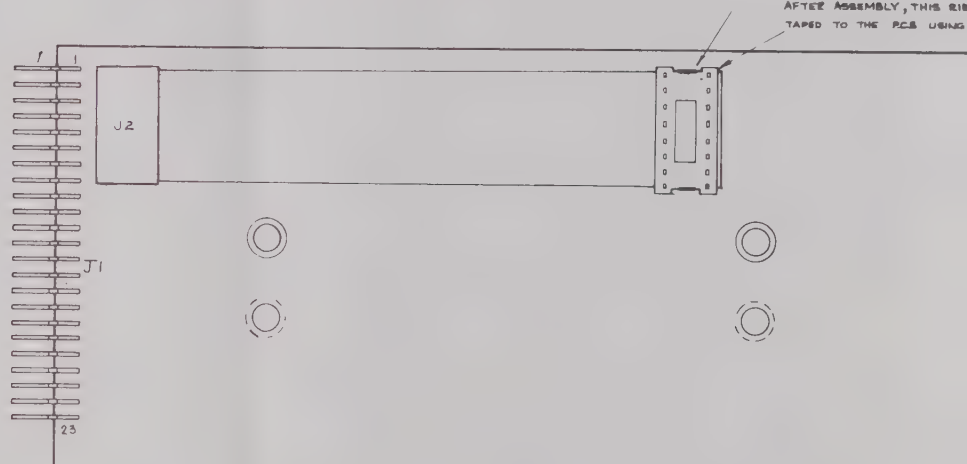
4 OFF AMP PIN (BLOCKS) PART No 604036 MUST BE AFFIXED FIRST

ENSURE ALL PINS ARE SEATED TIGHT & FLAT TO PC B. BEFORE SOLDERING.

NOTE. PINS ARE HELD TOGETHER BY A PLASTIC STRIP. THIS STRIP IS TO BE CUT TO SUIT THE AMOUNT OF PINS REQUIRED

RIBBON CABLE ASS

AFTER ASSEMBLY, THIS RIB TAPED TO THE PCB USING



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES
IL	MJP	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± DECIMAL TO 2 PLACES ± FRACTIONAL ±
TRACED	APPROVED	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± DECIMAL TO 1 PLACE ± WHOLE DIMENSIONS ±
DATE 9.10.80	DATE 9.10.80.	2:1 NOT TO BE SCALED	UNLESS OTHERWISE STATED

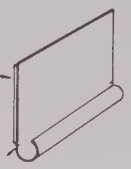
5	6	7

ALL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
A	
1	RELEASED 18.12.80
2	ECO 1217 RIBBON CABLE WAS 572165/B. JR 18·2·81

1 OFF CABLE CLIP
(DATRON PART No 630023.)



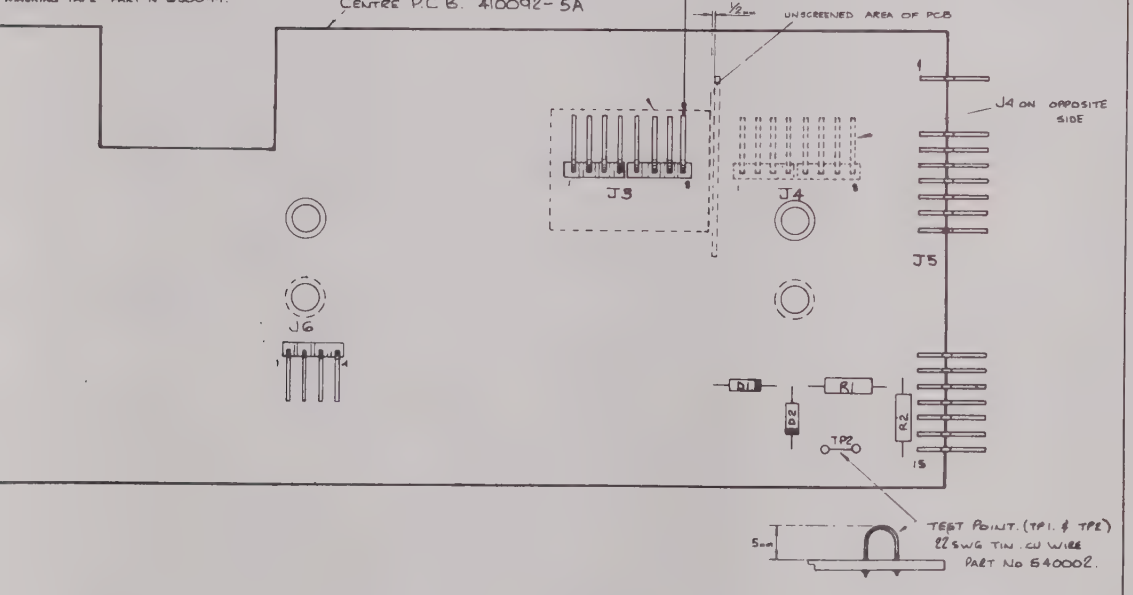
CUT OFF PART SHOWN BY DOTTED LINE.
STICK ON OPPOSITE SIDE OF P.C.B. TO COVER SOLDER JOINTS OF J3 AS SHOWN DOTTED.

572150/C

5 OFF GOLD RIGHT ANGLED PIN ASSY (PART No 604038)
PLACED TOGETHER AS SHOWN BELOW.

BON CABLE IS TO BE
MASKING TAPE PART N°G30099.

CENTRE P.C.B. 410092-5A

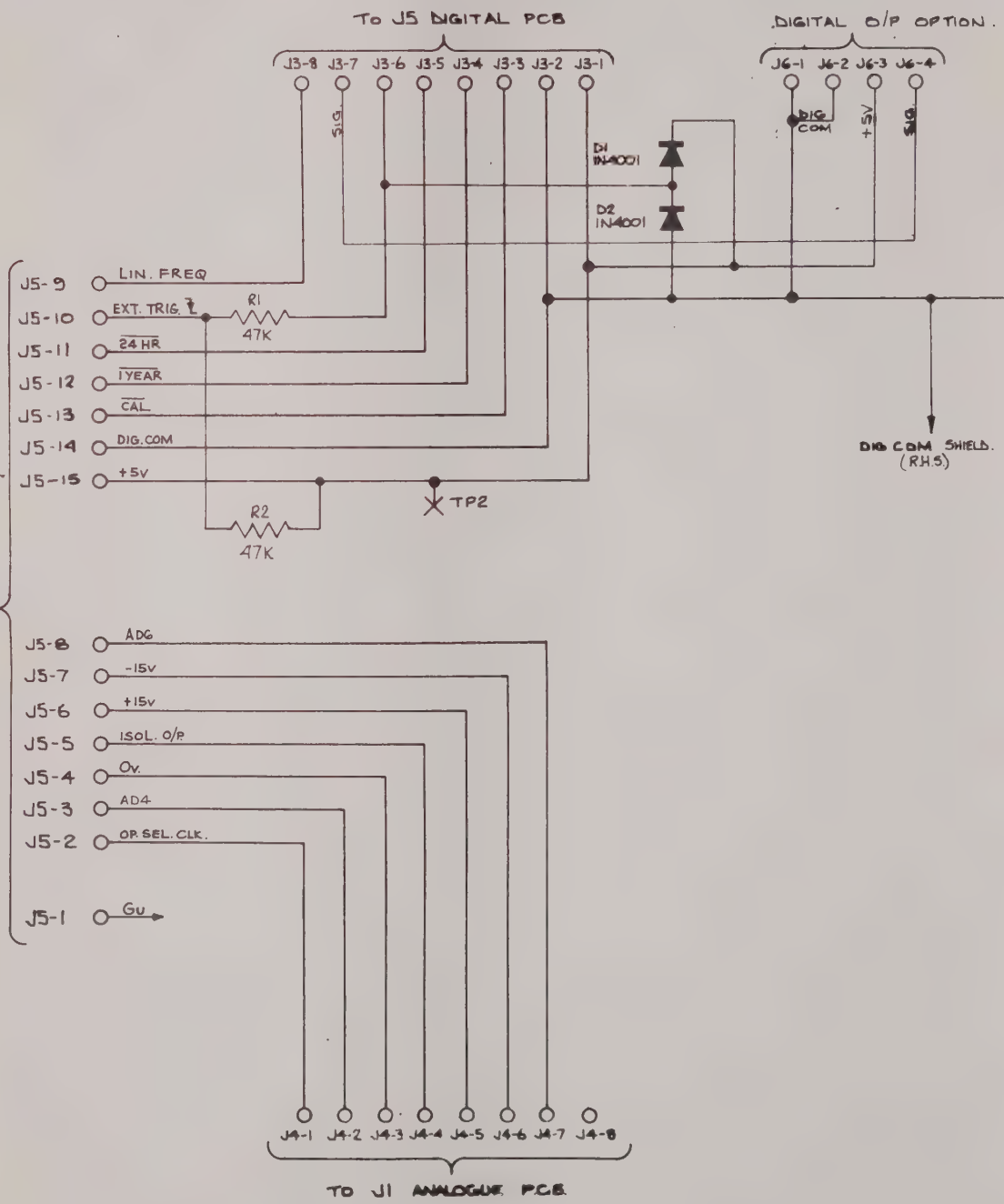


MATERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
FINISH	TITLE CENTRE P.C.B ASSEMBLY. 1065	DRAWING No. 400419	SHEET 1 OF 2

DRAWING No.
430419
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

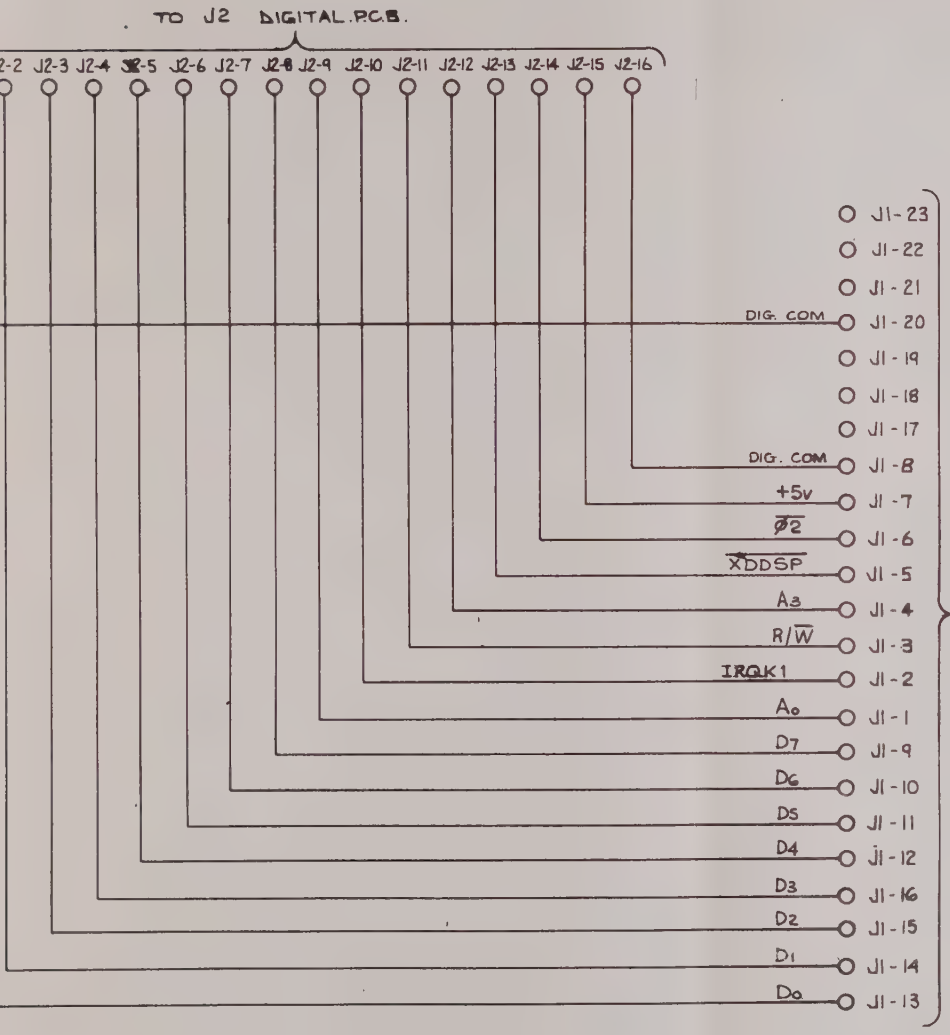


DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	MATERIAL
TRACED	APPROVED	MILLIMETRES	SCALE	FINISH
DATE 15.10.80	DATE	NOT TO BE SCALED		

4	5	6
LL BURRS TO BE REMOVED		NOTES

1. "IN GUARD" TRACKS TO BE ON CCT. SIDE (SHT. 2) & "OUT OF GUARD" TRACKS TO BE ON THE COMP. SIDE (SHT. 3) OF P.C.B. WHERE POSSIBLE.

REV	CHANGES
A	
1	RELEASED 18.12.80



DRAWING SIZE A2

datron ELECTRONICS LTD. NORWICH.

TITLE CENTRE PCB SCHEMATIC 1065

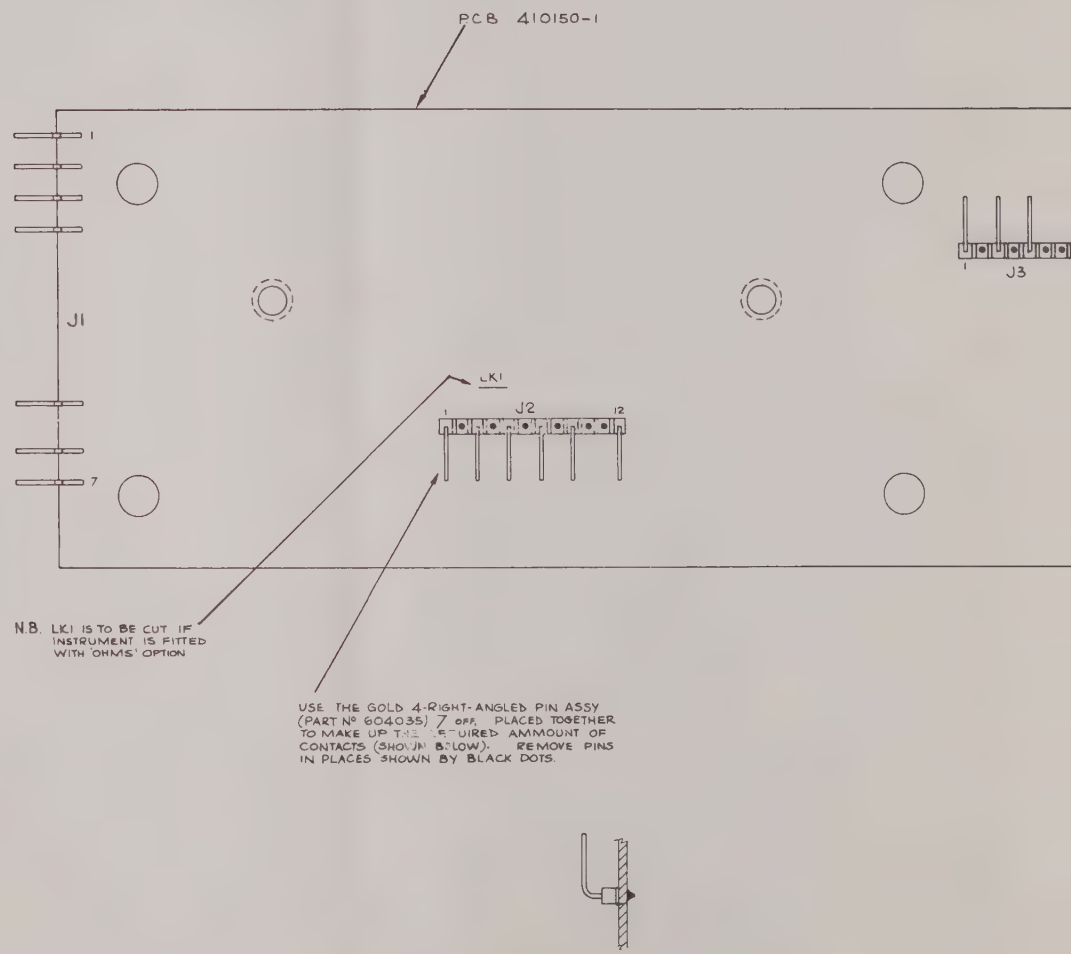
DRAWING No. 4419 ISSUE 1

DRAWING No. 400420

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308


PCB 410150-1
1
J1
7
LK1
J2
1
12
J3
1
N.B. LK1 IS TO BE CUT IF INSTRUMENT IS FITTED WITH 'OHMS' OPTION
USE THE GOLD 4-RIGHT-ANGLED PIN ASSY (PART Nº 604035) 7 OFF, PLACED TOGETHER TO MAKE UP THE REQUIRED AMMOUNT OF CONTACTS (SHOWN BELOW). REMOVE PINS IN PLACES SHOWN BY BLACK DOTS.

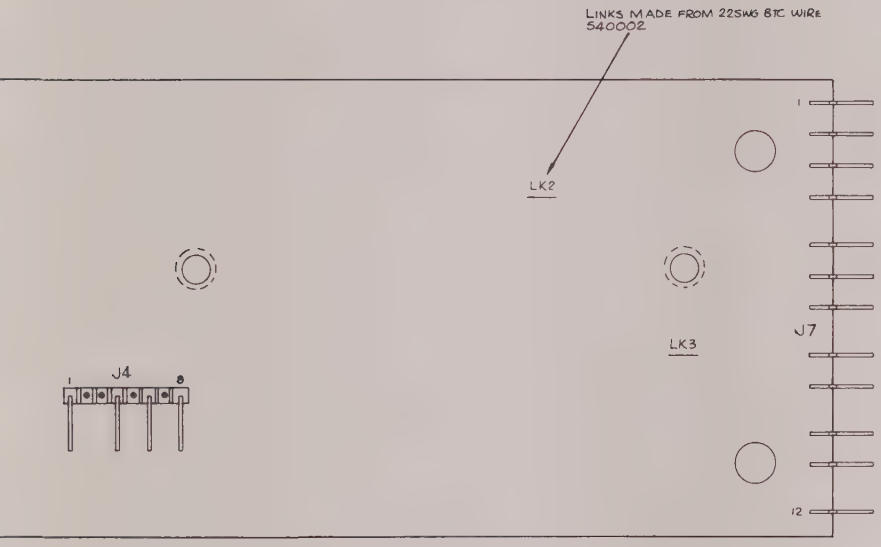
DRAWN	CHECKED D King	DIMENSIONS IN MILLIMETRES	TOLERANCES INCH DIMENSIONS DECIMAL TO 3 PLACES ±.005 DECIMAL TO 2 PLACES ±.01 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ±0.25 DECIMAL TO 1 PLACE ±0.1 WHOLE DIMENSIONS ±0.5 UNLESS OTHERWISE STATED
DATE 18.9.80	APPROVED DATE	SCALE 2:1 NOT TO BE SCALED	

5 6 7

ALL BURRS TO BE REMOVED

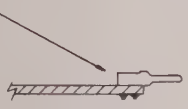
NOTES

SY.	CHANGES
A	
1	RELEASED 18 12 80



IMPORTANT :

2 OFF AMP PINS (PART Nº 604036) MUST BE AFFIXED FIRST ENSURE ALL PINS ARE SEATED TIGHT & FLAT TO PCB BEFORE SOLDERED.



NOTE. PINS ARE HELD TOGETHER BY A PLASTIC STRIP. THIS STRIP IS TO BE CUT TO SUIT THE NUMBER OF PINS REQ'D.

ANGULAR ± °
.005
.010
.64
1mm
2mm
4mm

MATERIAL

FINISH

datron ELECTRONICS LTD. NORWICH.

TITLE

L.H. PCB. ASSY. 1065.

DRAWING SIZE

A1

DRAWING No

400420

SHEET

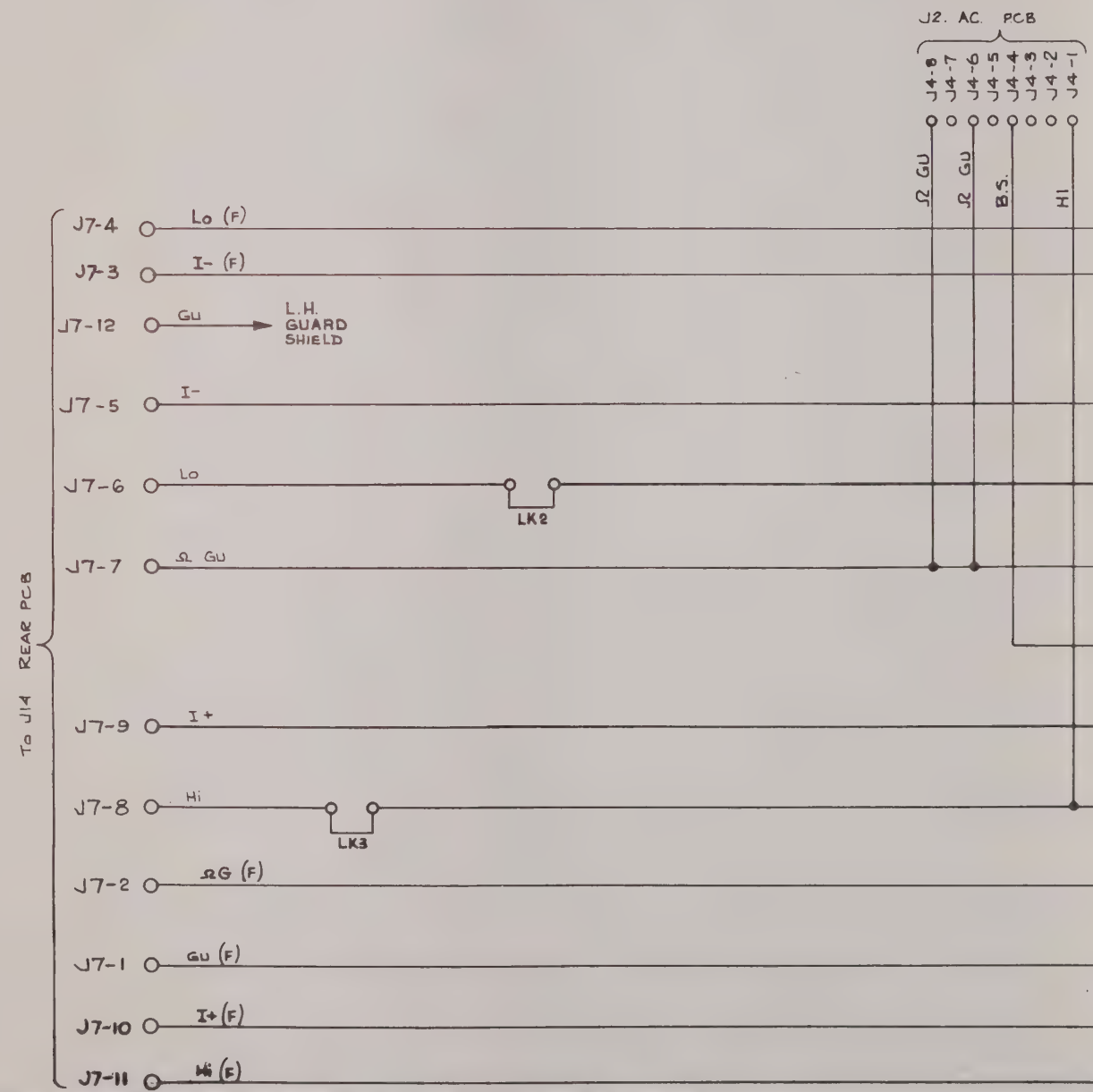
1 OF 2

DRAWING No. 430420

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	MATERIAL
IL	D. King	MILLIMETRES	ANGULAR ± ½°	
TRACED	APPROVED	SCALE	INCH DIMENSIONS: DECIMAL TO 3 PLACES ± .005; DECIMAL TO 2 PLACES ± .010; FRACTIONAL ± 1/64	FINISH
4.12.82			METRIC DIMENSIONS: DECIMAL TO 2 PLACES ± 1mm; DECIMAL TO 1 PLACE ± 2mm	

4 | 5 | 6

BURRS TO BE REMOVED

NOTES

1/ ALL CIRCUIT TO BE ON THE COMPONENT (SHEET 3) SIDE OF P.C.B WHERE POSSIBLE.

2/ GUARD, VIA J7-12 TO PROVIDE ELECTROSTATIC SHIELD ON CIRCUIT (SHEET 2) SIDE OF P.C.B. WHERE POSSIBLE.

3/ B.S, VIA J3-5, TO ENCLOSE Hi AND I+ CIRCUITS ON P.C.B WHERE POSSIBLE.

4/ Ω GUARD VIA J3-3 TO ENCLOSE LO & I- CIRCUITS ON P.C.B WHERE POSSIBLE.

A	
1	RELEASED 18.12.80

(PINS 1 & 5 LINKED BY LK1 WHEN Ω OPTION IS NOT FITTED)

J1. Ω P.C.B.

J2-1 J2-2 J2-3 J2-4 J2-5 J2-6 J2-7 J2-8 J2-9 J2-10 J2-11 J2-12

Lo' I- Lo Lo' B.S. I+

J6. ANAL. P.C.B.

J3-8 J3-7 J3-6 J3-5 J3-4 J3-3 J3-2 J3-1

Hi B.S. Ω Gu Lo'

LK1

J1-4

J1-3

J1-5

J1-2

J1-1

J1-6

J1-7

TO J1 FRONT P.C.B.

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE L.H. P.C.B SCHEMATIC 1065

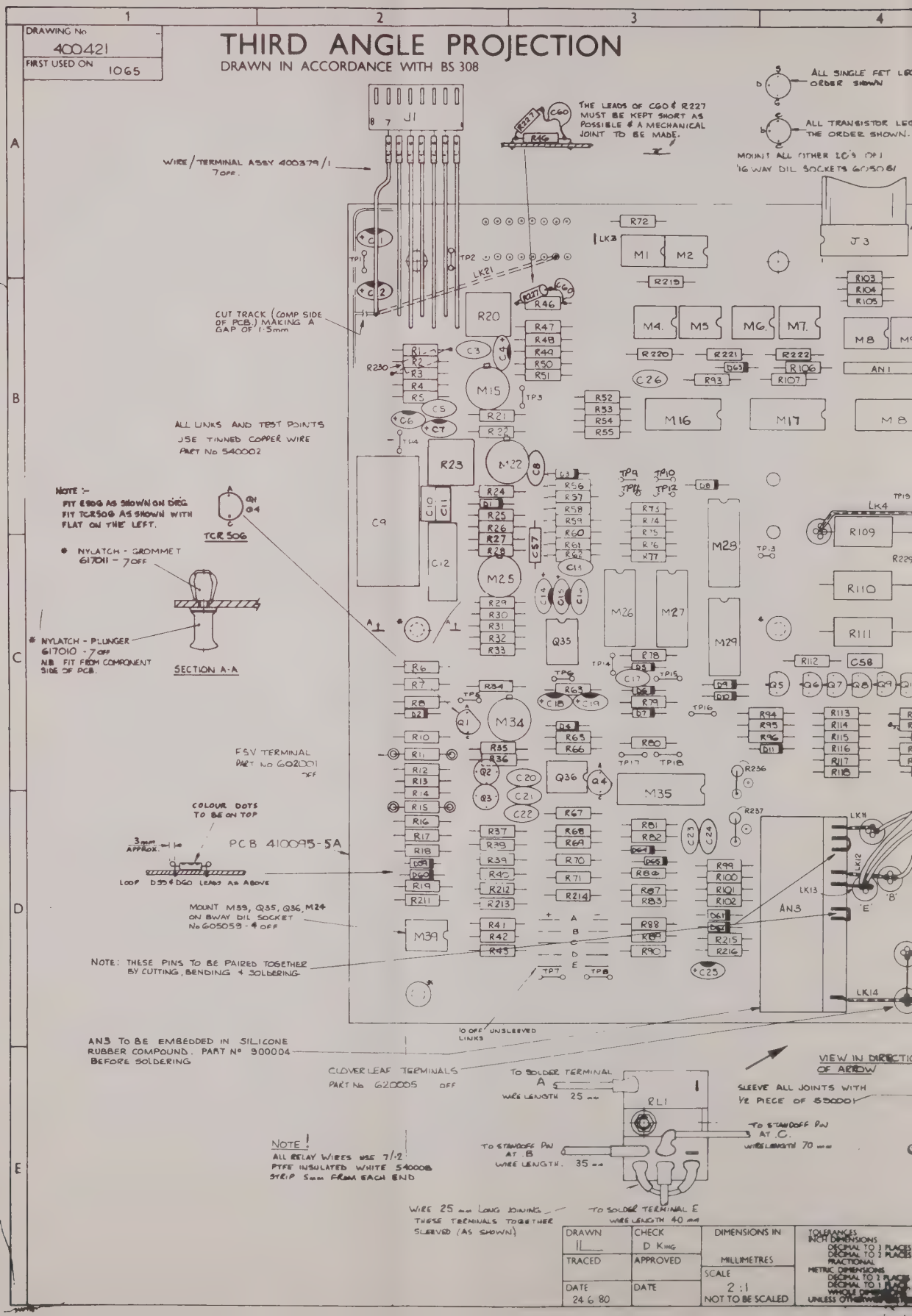
DRAWING No. 430420

DRAWING No. 400421

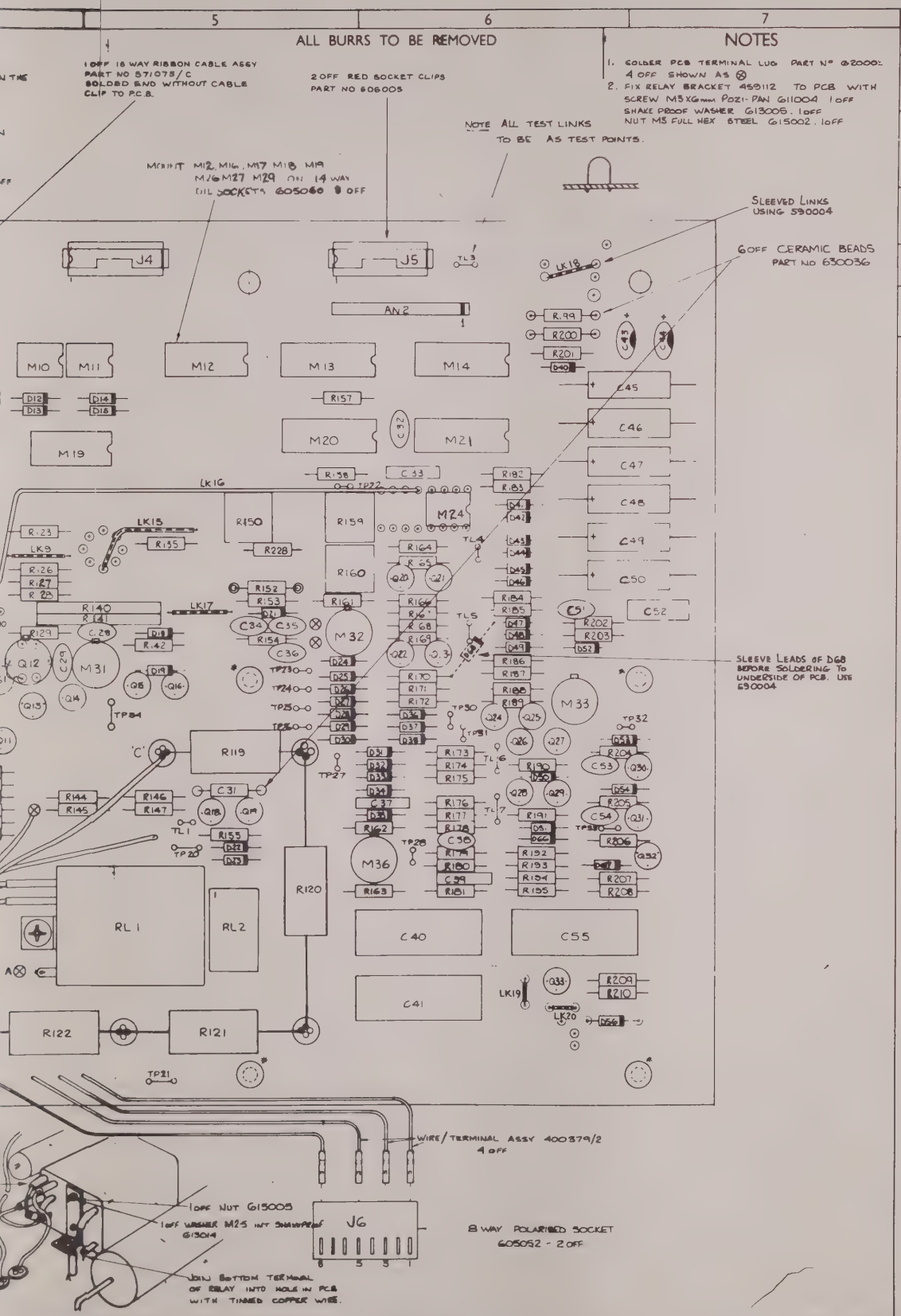
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308


J1
WIRE/TERMINAL ASSY 400379/1 7 OFF.
CUT TRACK (COMP SIDE OF PCB.) MAKING A GAP OF 1.5mm
ALL LINKS AND TEST POINTS USE TINNED COPPER WIRE PART No 540002
NOTE :- FIT E506 AS SHOWN ON DIAG. FIT TCR506 AS SHOWN WITH FLAT ON THE LEFT.
TCR 506
* NYLATCH - GROMMET 617011 - 7 OFF
* NYLATCH - PLUNGER 617010 - 7 OFF N.B. FIT FROM COMPONENT SIDE OF PCB.
SECTION A-A
FSV TERMINAL PART No 602001 7 OFF
COLOUR DOTS TO BE ON TOP
3mm APPROX.
PCB 410095-5A
LOOP D59 & D60 LEADS AS ABOVE
MOUNT M39, Q35, Q36, M24 ON 8WAY DIL SOCKET No 605059 - 4 OFF
NOTE: THESE PINS TO BE PAIRED TOGETHER BY CUTTING, BENDING & SOLDERING
THE LEADS OF C60 & R227 MUST BE KEPT SHORT AS POSSIBLE & A MECHANICAL JOINT TO BE MADE.
ALL SINGLE FET LEADS IN ORDER SHOWN
ALL TRANSISTOR LEADS IN THE ORDER SHOWN.
MOUNT ALL OTHER IC'S ON 16 WAY DIL SOCKETS 605061
AN3 TO BE EMBEDDED IN SILICONE RUBBER COMPOUND. PART No 900004 BEFORE SOLDERING
CLOVER LEAF TERMINALS PART No 620005 6 OFF
10 OFF UNSLEEVED LINKS
TO SOLDER TERMINAL A 5 WIRE LENGTH 25 mm
TO STANDOFF PIN AT B WIRE LENGTH 35 mm
TO STANDOFF PIN AT C WIRE LENGTH 70 mm
TO SOLDER TERMINAL E WIRE LENGTH 40 mm
WIRE 25 mm LONG JOINING THESE TERMINALS TOGETHER SLEEVED (AS SHOWN)
SLEEVE ALL JOINTS WITH ½" PIECE OF 530001
VIEW IN DIRECTION OF ARROW
NOTE ! ALL RELAY WIRES USE 7/2 PTFE INSULATED WHITE 540008 STRIP 5mm FROM EACH END
RL1
AN3
J3
M1 M2 M4 M5 M6 M7 M8 M15 M16 M17 M22 M25 M26 M27 M28 M29 M34 M35 M39
Q35 Q36
R20 R46 R72 R109 R110 R111 R112 R113 R114 R115 R116 R117 R118
C9 C12 C57 C58
LK3 LK4 LK11 LK12 LK13 LK14

DRAWN	CHECK	DIMENSIONS IN	TOLERANCES
IL	D King	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 1 PLACES DECIMAL TO 2 PLACES FRACTIONAL METRIC DIMENSIONS DECIMAL TO 1 PLACE DECIMAL TO 2 PLACES WHOLE DIMENSIONS UNLESS OTHERWISE
TRACED	APPROVED	SCALE 2:1 NOT TO BE SCALED	
DATE 24 6 80	DATE		



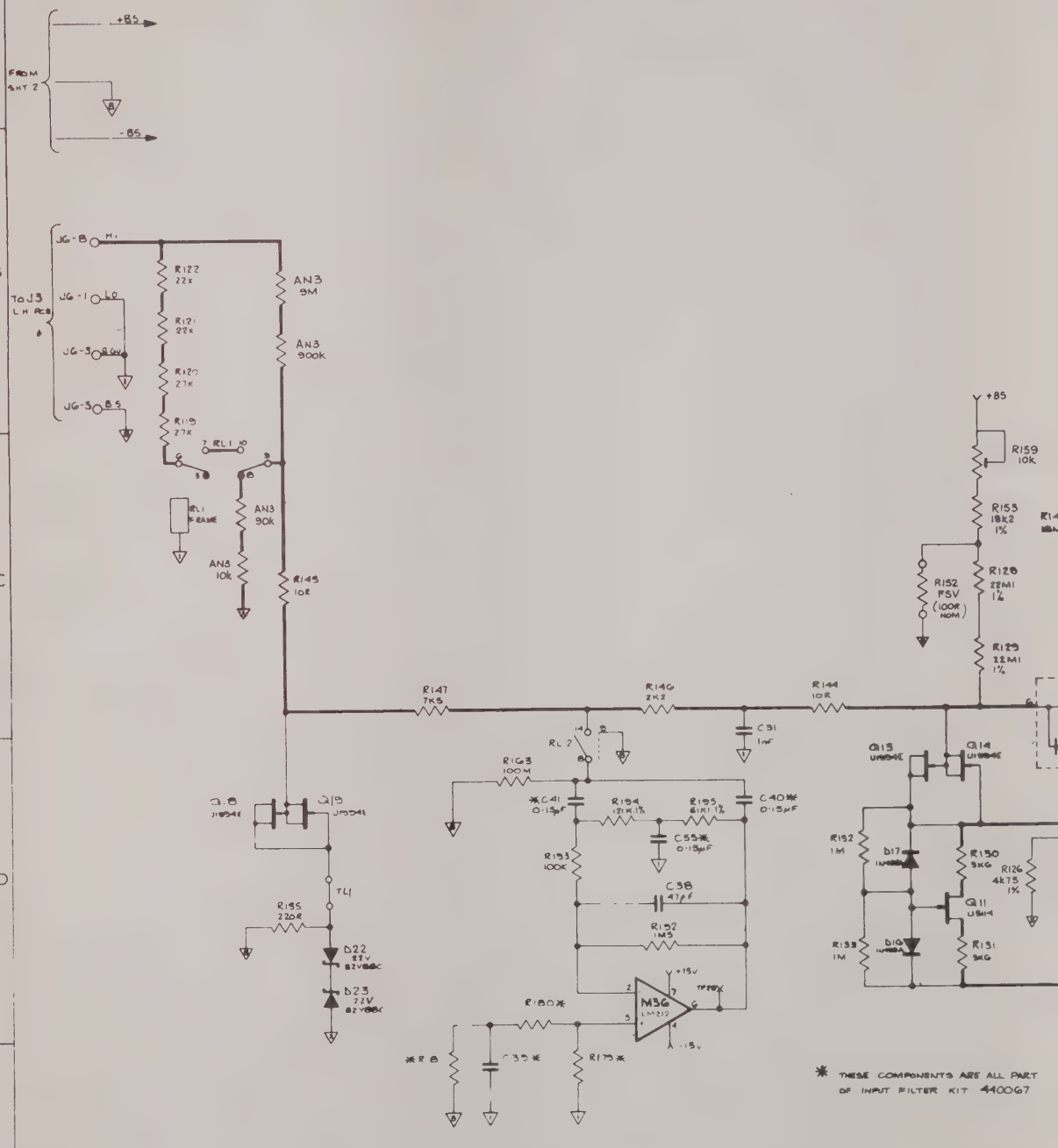
ISS	CHANGES
B	
1	RELEASED 1.8.80
2	ECO 1151 1168 PARTS LIST CHANGE TO R123 Q35 + Q36 WERE 2N3936 IL. 23.9.80 MD
3	ECO 1184, 1182 1184 1188 1191, 1193, 1192 Q35 + Q36 NOW MOUNT ON DIL SOCKET 605095 R236 + R237 ADDED FURTHER PARTS LIST CHANGES. IL. 15.12.80 MD
4	ECO. 1181 LK5-LK8 + LINK UNDER M12 DELETED R52-R55, R72, D12-D15, M24 + M19 ADDED IL. 5.1.81 MD
5	ECO 1217 J3 WAS 16 WAY SOCKET JC 17-8-81 MD
6	ECO. 1234, 1244, 1248 LK19 LK2 DELETED R13, R35, R36, Q2 + Q3 ADDED IL. 30.10.81 MD

GULAR +/-	MATERIAL	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE A1
		TITLE 1065 ANALOGUE PCB ASSEMBLY	DRAWING No. 400421

DRAWING No	430421
FIRST USED ON	1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



* THESE COMPONENTS ARE ALL PART OF INPUT FILTER KIT 440067

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES
IL	D KING	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES DECIMAL TO 2 PLACES FRACTIONAL
TRACED	APPROVED	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES DECIMAL TO 1 PLACES WHOLE DIMENSIONS
DATE 24 6 80	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED

5 | 6 | 7

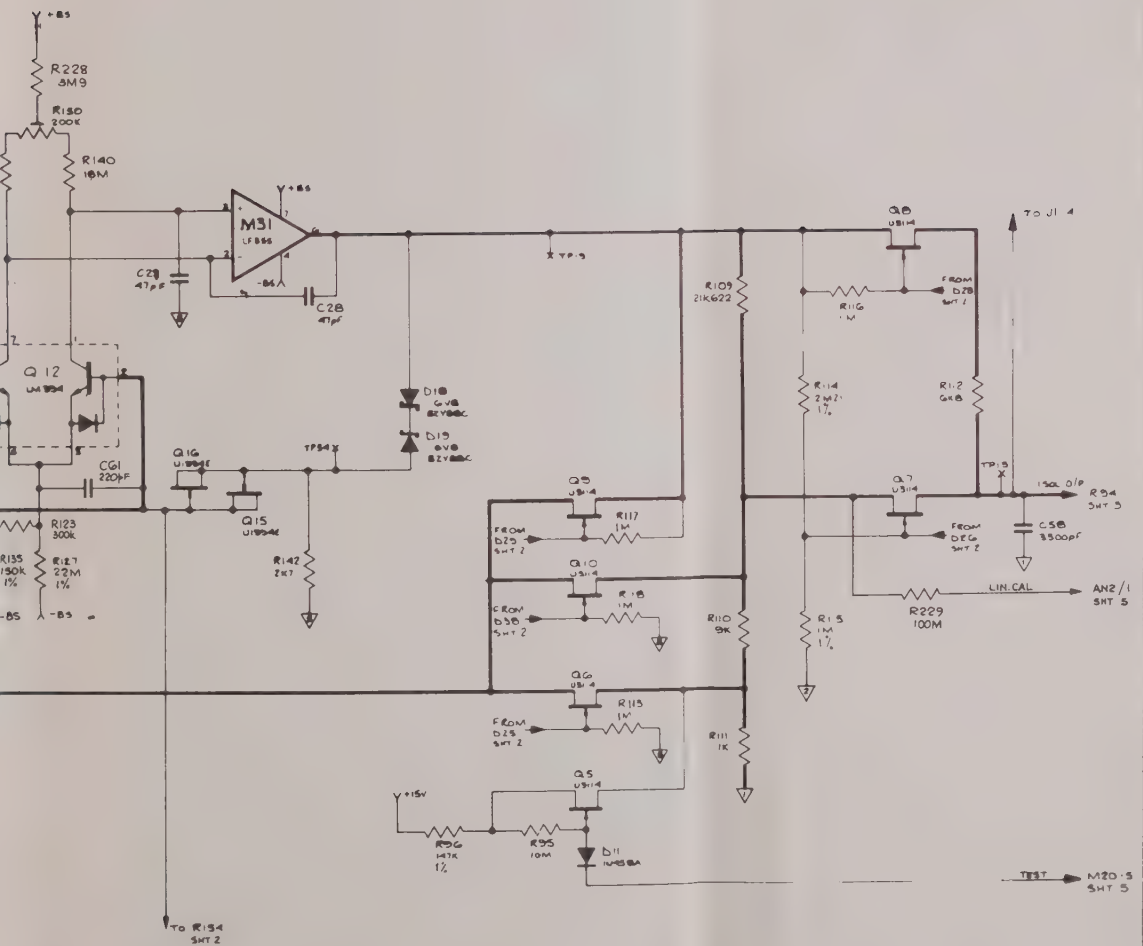
ALL BURRS TO BE REMOVED

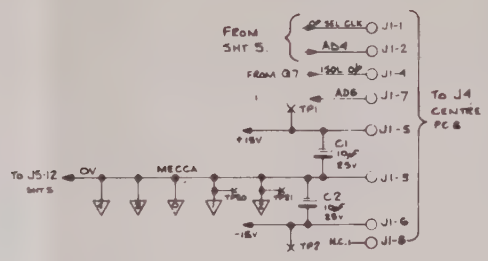
NOTES

= SIGNAL COMMONS

= ANALOGUE COMMON

ISS.	CHANGES
A	
1	RELEASED 1.8.80
2	ECO 1151, 1168. R123 WAS 390k SEE ALSO SHEET 3 IL 23 9 80
3	ECO 1184, 1188, 1191, 1192. R150 WAS 100k IL 16.12.80
4	ECO 1181 SEE SHT 5 FOR CHANGES IL 5 1 81
5	ECO. 1234, 1244 SEE SHTS 3 + 4 IL 30.10.81



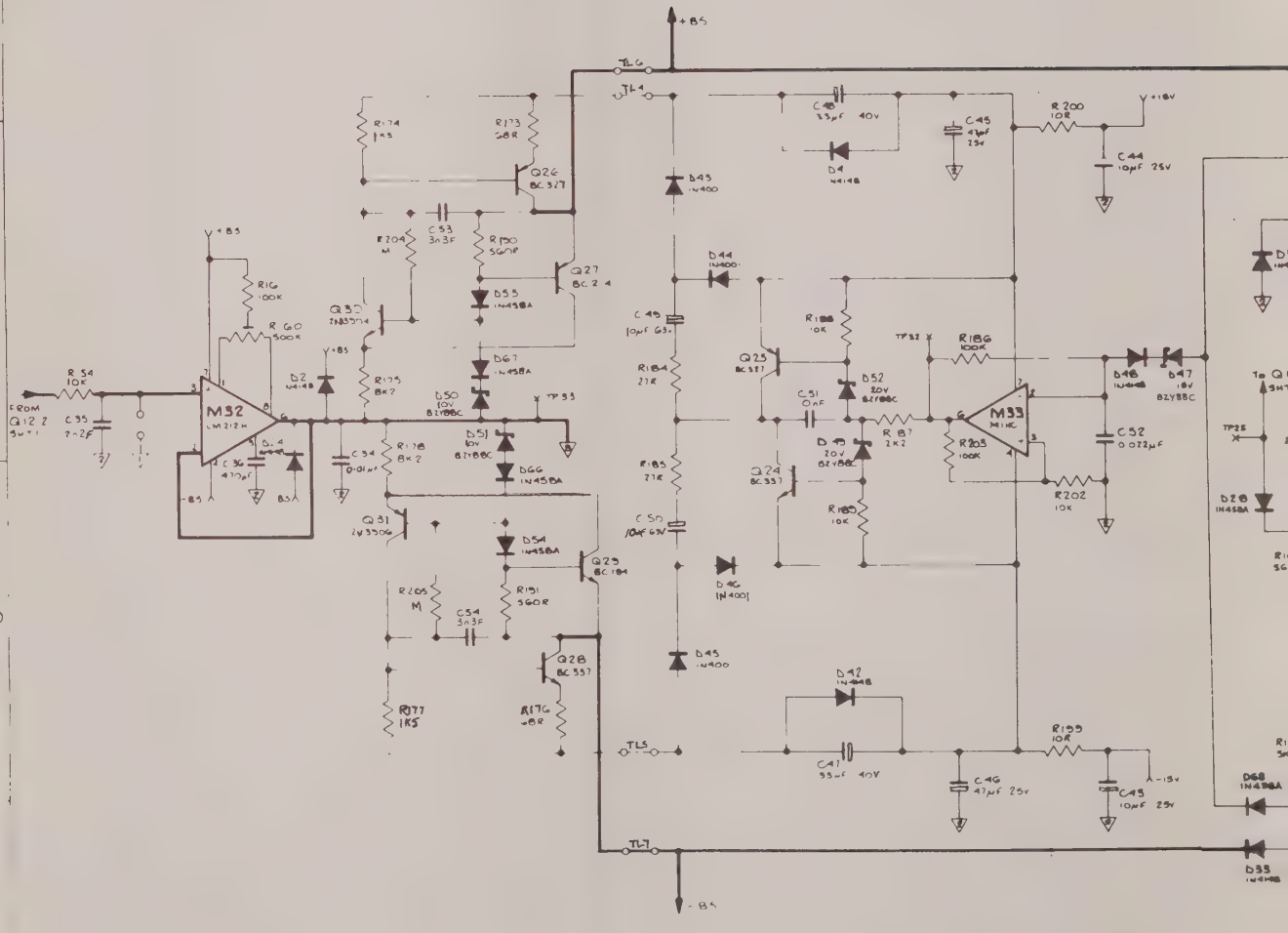


ANGULAR + °	MATERIAL	datron ELECTRO LTD. NORWICH.		DRAWING SIZE
+ .005 + .010 + 1/64				A1
+ 1mm + 2mm + 4mm	FINISH	TITLE	DRAWING No	SHEET
		Dr	430421	1 OF 8

DRAWING NO 430421
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	ANGULAR + °
IL	D KING	MILLIMETRES	INCH DIMENSIONS	
TRACED	APPROVED		DECIMAL TO 3 PLACES +	.005
		SCALE	DECIMAL TO 2 PLACES +	.010
DATE	DATE		FRACTIONAL +	1/64
24 6 80		NOT TO BE SCALED	METRIC DIMENSIONS	
			DECIMAL TO 2 PLACES +	1mm
			DECIMAL TO 1 PLACE +	2mm
			WHOLE DIMENSIONS +	4mm
			UNLESS OTHERWISE STATED	

5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

RANGE	FET CONTROL LINE TP 23	TP 24	TP 25	TP 26	TP 27
100 mv	1	0	1	0	0
1V	0	0	1	0	1
10V	0	1	0	1	0
100V	0	0	1	0	1
1000V	0	1	0	1	0
DC	0	0	0	1	0

LOGIC 1 = FET ON
0 = FET OFF

RANGE	INPUT CONTROL LINE LD7	LD6	LD5	LD4
100mV	X	1	1	0
1V	X	1	1	1
10V	X	1	0	1
100V	X	0	1	1
1000V	X	0	0	1
DC	1	0	0	0
FILTER	0	X	X	X

LOGIC 1 = 0V
0 = -15V

ISS	CHANGES
A	
1	RELEASED 1.8.80
2	SEE SHEETS 1 4 8
3	SEE SHEETS 1, 3 4 4 /L 16.12.80
4	SEE SHEET 5 /L 5.1.81
5	SEE SHTS 8 4 4

+15V

D56 IN4148

Q33 BC184 R210 10K R209 56K -15V

Q32 BC184 R207 10K R206 56K -15V

R208 35K

D31 IN4148

FILTER (LD7) → M21 3
ATTEN (LD6) → M21 4
DC → M20 3
RANGE (LD5) → M21 5
RANGE (LD4) → M21 6
} TO SHT 5

R182 4K7 R183 4K7

M24 FCD88C

Q21 IN3304

TO Q10 SHT 1 TO Q7 SHT 1 TO Q9 SHT 1 TO Q6 SHT 1

TP 27 TP 24 TP 26 TP 31 TP 23

D30 D38 D26 D27 D29 D37 D36 D25 IN4588A

R165 100K R164 100K R168 56K R169 56K R172 5M6 R171 560K R170 560K

Q22 2N3904 Q23 2N3304

TP 30

R162 3K9 D34 IN4148 D35 4V7 BYX88C C37 0.1μF -15V

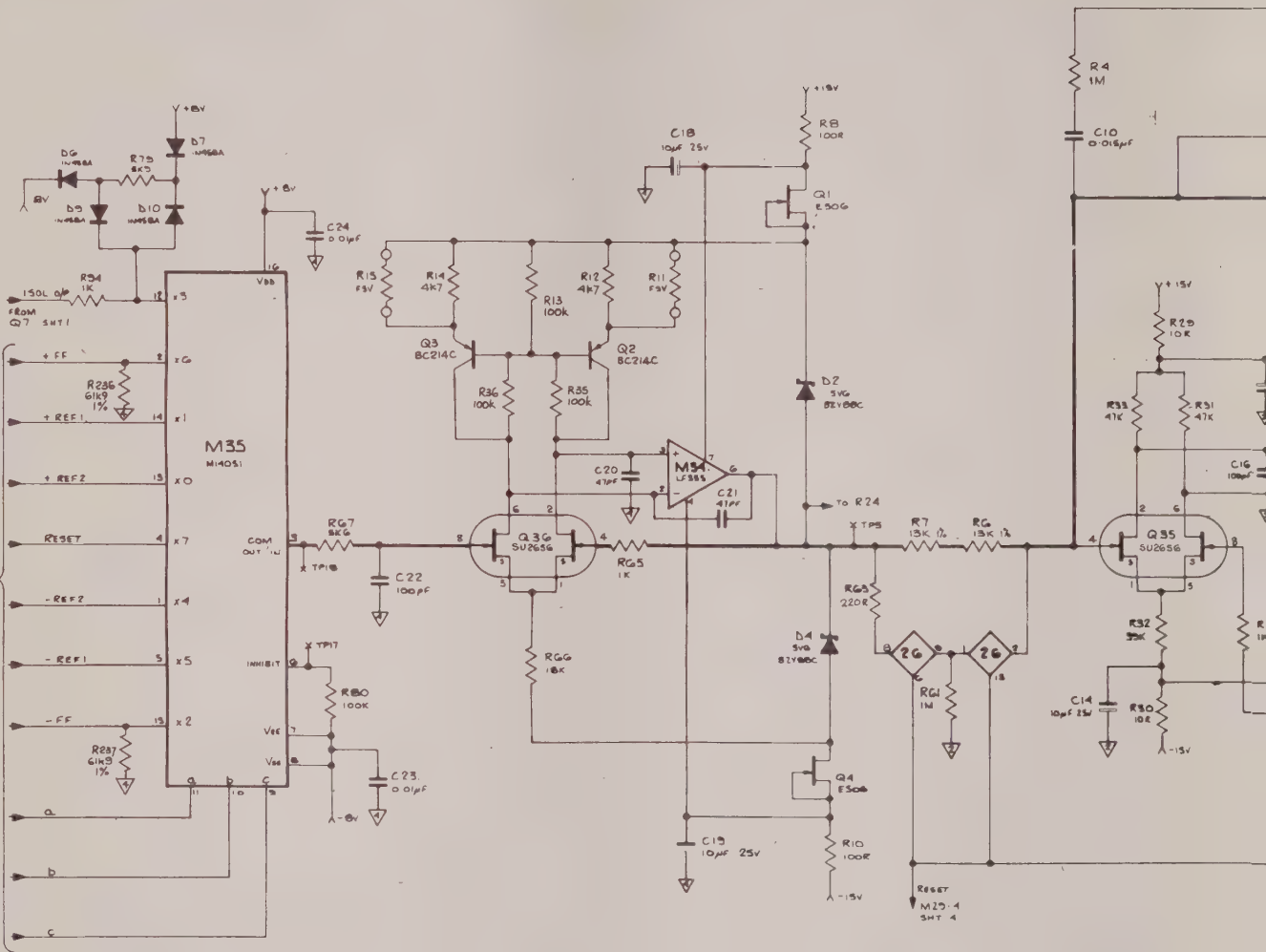
MATERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
FINISH	TITLE: BOOT STRAPPED SUPPLIES & RANGE LOGIC 1065	DRAWING No 430421	SHEET 2 OF 8

DRAWING No. 430421

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



CONDITION	MULTIPLEXER a	b	c	RESET
RESET	1	1	1	1
SIG	1	1	0	0
-Ve BIAS	0	1	0	0
+Ve REF 1	1	0	0	0
+Ve REF 2	0	0	0	0
+Ve BIAS	0	1	1	0
-Ve REF 1	1	0	1	0
-Ve REF 2	0	0	1	0

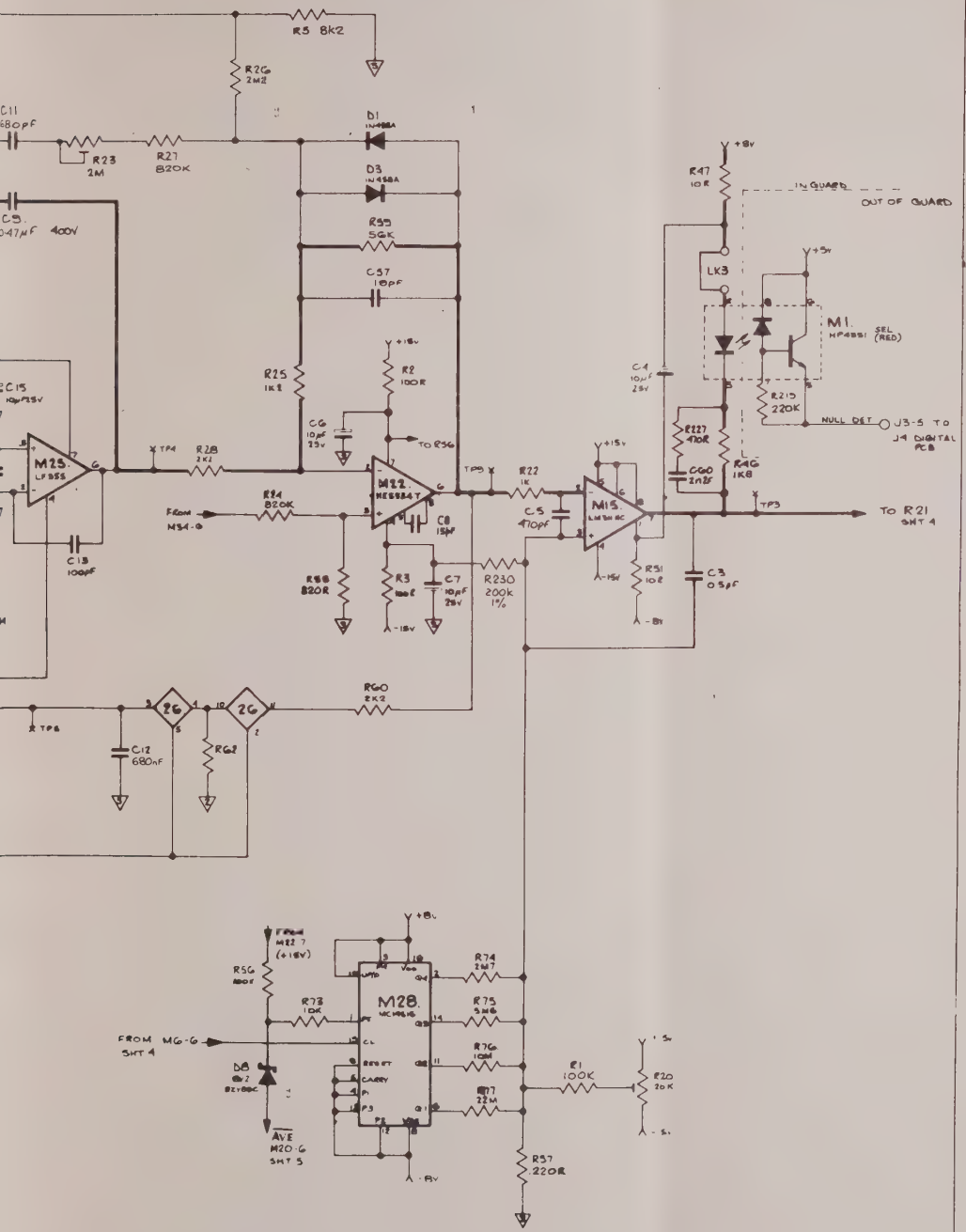
DRAWN IL	CHECKED D.K.NG	DIMENSIONS IN MILLIMETRES	TOLERANCES INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005; DECIMAL TO 2 PLACES ± .010; FRACTIONAL ± 1/64; METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm; DECIMAL TO 1 PLACE ± 2mm; WHOLE DIMENSIONS ± 4mm; UNLESS OTHERWISE STATED; ANGULAR ± °
TRACED	APPROVED	SCALE NOT TO BE SCALED	MATE
DATE 24 6 80	DATE		FINISH

5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
A	
1	RELEASED 1.8.80
2	Q35+Q36 WERE 2N3956
3	R236 + R237 ADDED. R57 WAS 200R R24 WAS 680k ll 16.12.80
4	SEE SHEET 5 ll 5.1.81
5	LK1 + LK2 DELETED. R13, R35, R36, Q24+Q3 ADDED. R124 R14 WERE 5kG R4 WAS 10M R5 WAS 18k C12 WAS 0.47μF SEE ALSO SHT. 4 ll 30.10.81



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A1

TITLE: A-D CONVERTOR 1065

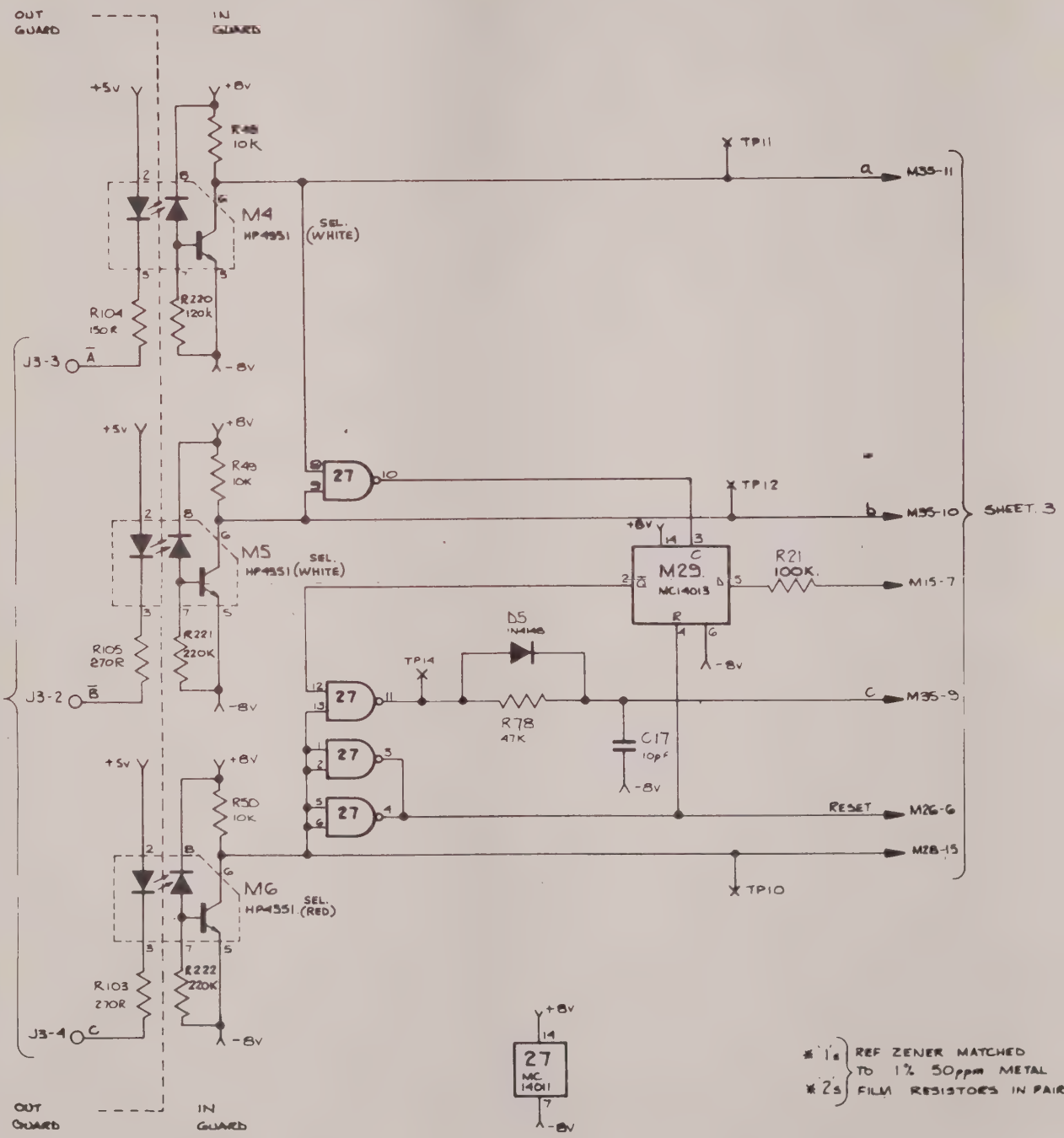
DRAWING No. 430421

SHEET 3 OF 5

DRAWING No.	
430421	
FIRST USED ON	1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



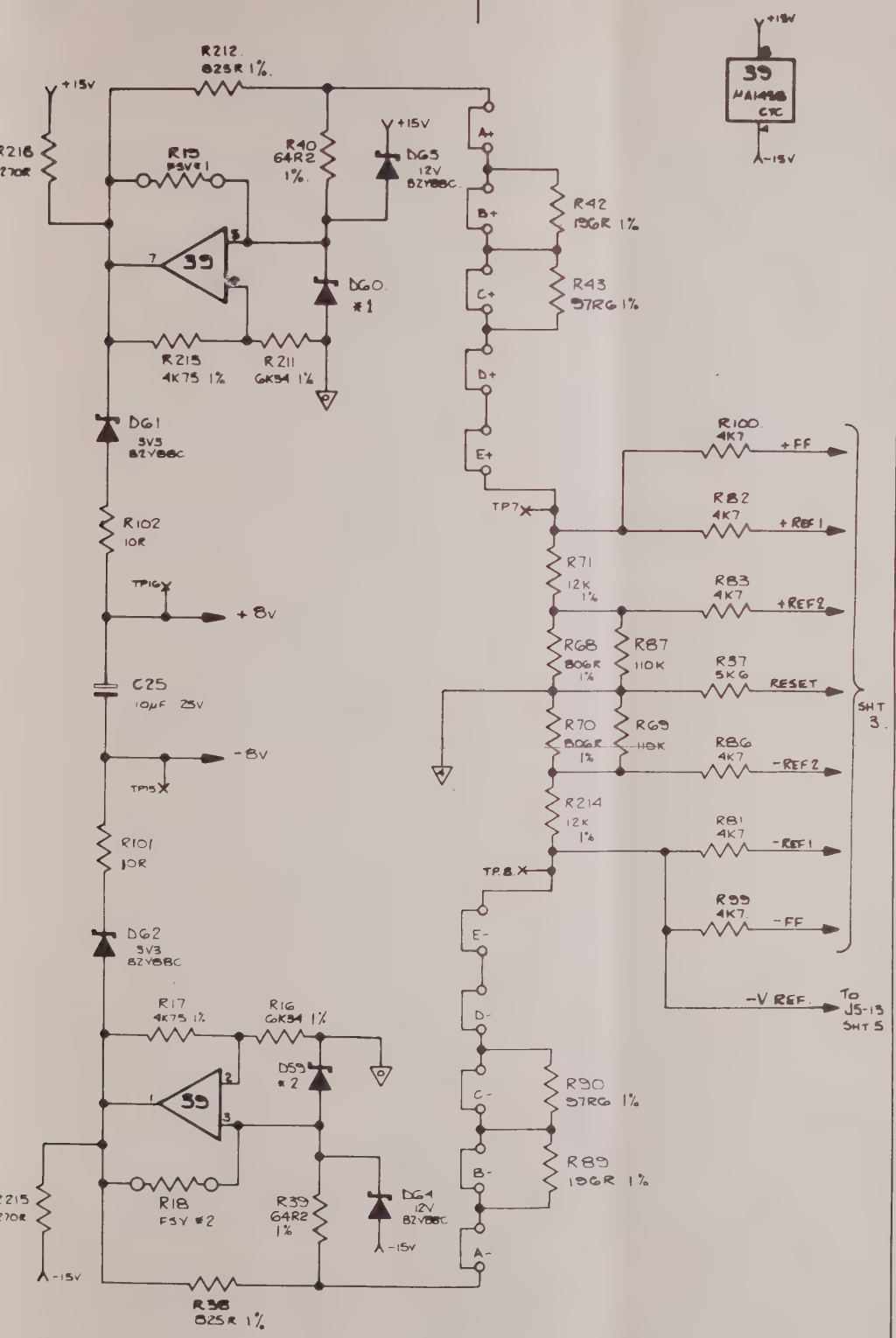
DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES ANGULAR ± ½°	MATERIAL
IL	D. KING	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64	
TRACED	APPROVED	SCALE	METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ∓ 4mm	FINISH
DATE 24.6.80	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

4 5 6

BURRS TO BE REMOVED

NOTES

A	
1	RELEASED 1.8.80
2	SEE SHEETS 1 + 3 MD
3	R48 WAS 5KG. R105 WAS 150R R220 WAS 220k. IL 16.12.80 MD
4	SEE SHEET 5 IL 5.1.81 MD
5	M4, M5 + M6 WERE HP4351 R39 + R40 WERE 40R2. SEE ALSO SHT. 3 IL 30.10.81 MD



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

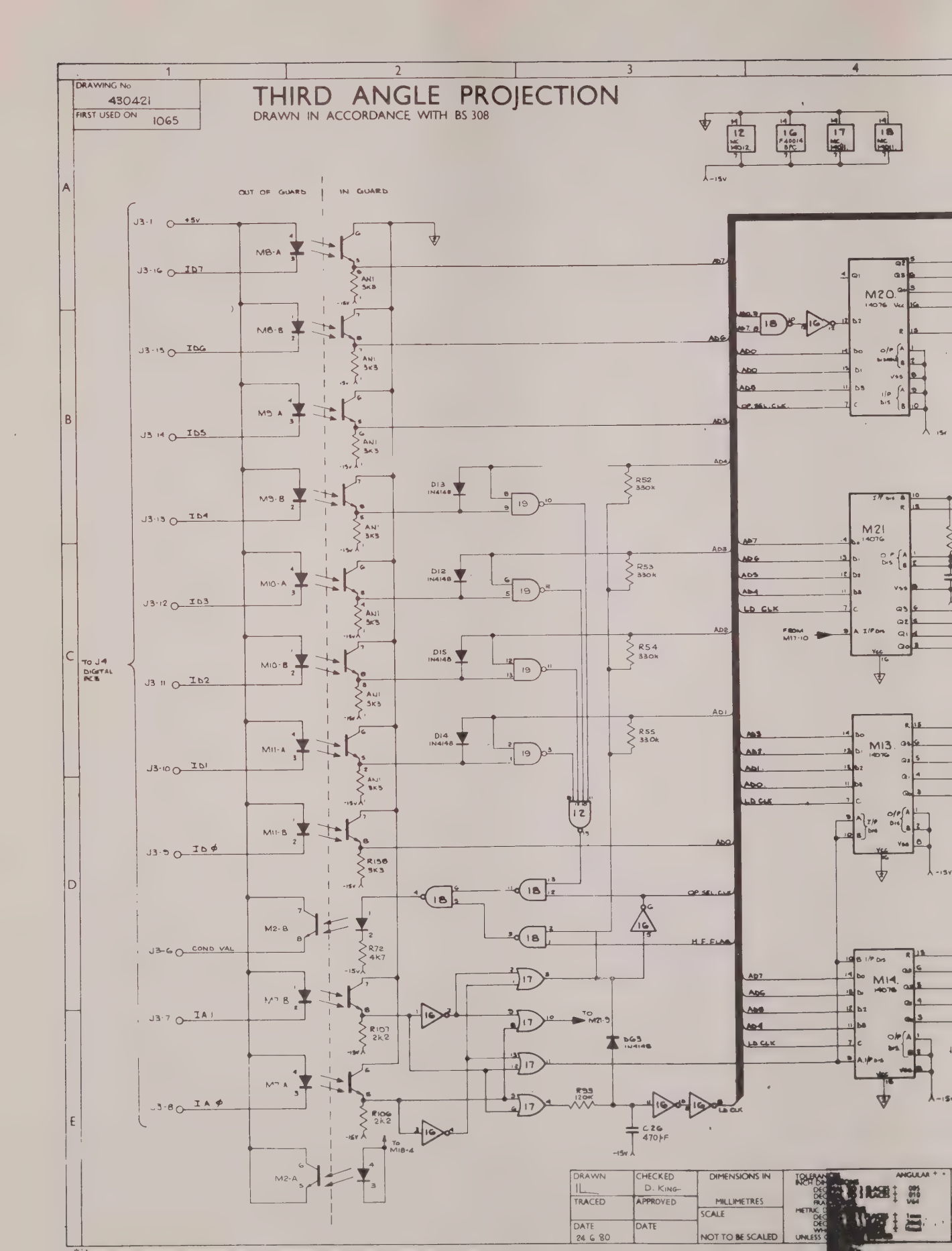
TITLE	DRAWING No.	SHEET
A-D CONTROL & REFERENCES. 1065	430421	4 OF 5

DRAWING No 430421

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



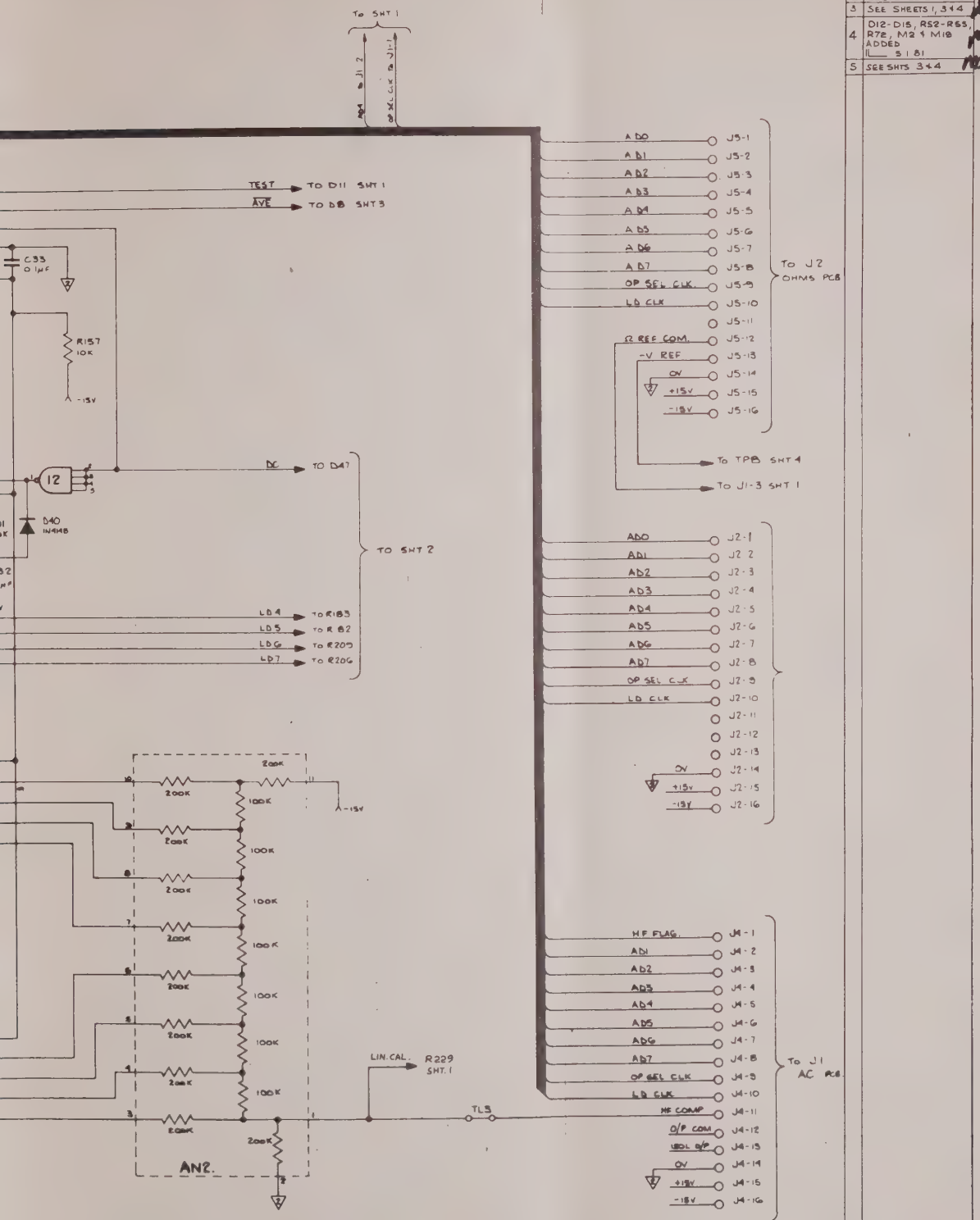
DRAWN	CHECKED	DIMENSIONS IN
IL	D. KING	MILLIMETRES
TRACED	APPROVED	SCALE
DATE 24 6 80	DATE	NOT TO BE SCALED

5	6	7

ALL BURRS TO BE REMOVED

NOTES

ISS	CHANGES
A	
1	RELEASED 1.8.80
2	SEE SHEETS 1 + 3
3	SEE SHEETS 1, 3+4
4	D12-D15, RS2-RS5, R78, M21 + M18 ADDED IL 5.1.81
5	SEE SHTS 3+4



ERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
GH	TITLE ANALOGUE INTERFACE LOGIC 1065	DRAWING No 430421	SHEET 5 OF 5

ALL BURRS TO BE REMOVED

NOTES

1 MAKE TP1–TP29 FROM 22 SWG BTC WIRE — PART Nº 540002

2 LINKS(LK) MADE FROM 22SWG BTC WIRE (540002) AND SLEEVED (EXCEPT FOR LK19–LK34) 590004

3 MOUNT MI 2 21.17 22 28 29 33.34 37–40, 44–46 48 49 52.54 55 56 ON 14 WAY DIL SOCKETS PART Nº 605060— 22OFF

4 MOUNT M3–14 16 24–27 32 41 42 43/60 47 50 58 59 51 57 5/61 ON 16 WAY DIL SOCKETS PART Nº 605061 — 28 OFF

5 MOUNT M30 + 35 ON 24 WAY DIL SOCKETS PART Nº 605064

6 MOUNT M19 20 ON 22 WAY DIL SOCKETS PART Nº 605063

7 MOUNT M23 ON 28 WAY DIL SOCKET PART Nº 605065

8 MOUNT M53 ON 40 WAY DIL SOCKET PART Nº 605050

9 MOUNT M62 ON 8WAY DIL SOCKET PART Nº 605059

10 MOUNT M 31 36 ON 18 WAY D.I.L SOCKET PART No 605062

ISS.	CHANGES
A	
B	R104 ADDED 23.7.80
1	RELEASED 1.8.80
2	ECO. 1158 1159 D21 ADDED PARTS LIST CHANGES 22.9.80
3	ECO 1181. 1188 J1 WAS SKT 605002 WITH CLIP 606003 TRACKS FROM J2 PINS 8 & 10 ON UNDERSIDE OF PCB CUT LK36 & LK37 ADDED OTHER CHANGES to PSLT 5.1.81
4	ECO 1214 R103, 104, D21, C58 TRACKED ONTO P.C.B. D16, C32, TP6, 5, 10, 12 MOVED M21 WAS 280037 LK36 AND LK37 NOW TCW PC B WAS 155:- 410096 7A JR 11-6-81
5	ECO 1243, 1251, 1253 R56 WAS 100K R45 WAS 330K M 31. 36 WERE 22 PIN 256 X 4 BIT RAM PCB WAS 155 8B TRACK FROM J2-11 NO LONGER CUT J3 WAS 605064 JR 2.12.81

BUS STRIP 920048

N.B.
FOR 400Hz OPERATION, LK7 TO BE FITTED AND LK5 50Hz OPERATION TO BE REMOVED

* NYLATCH - PLUNGER 617010 - 8 OFF
NB FIT FROM COMPONENT SIDE OF PCB

NYLATCH - GROMMET 617011 - 8 OFF

SECTION A-A (TYPICAL)

AY D.I.L. SOCKET

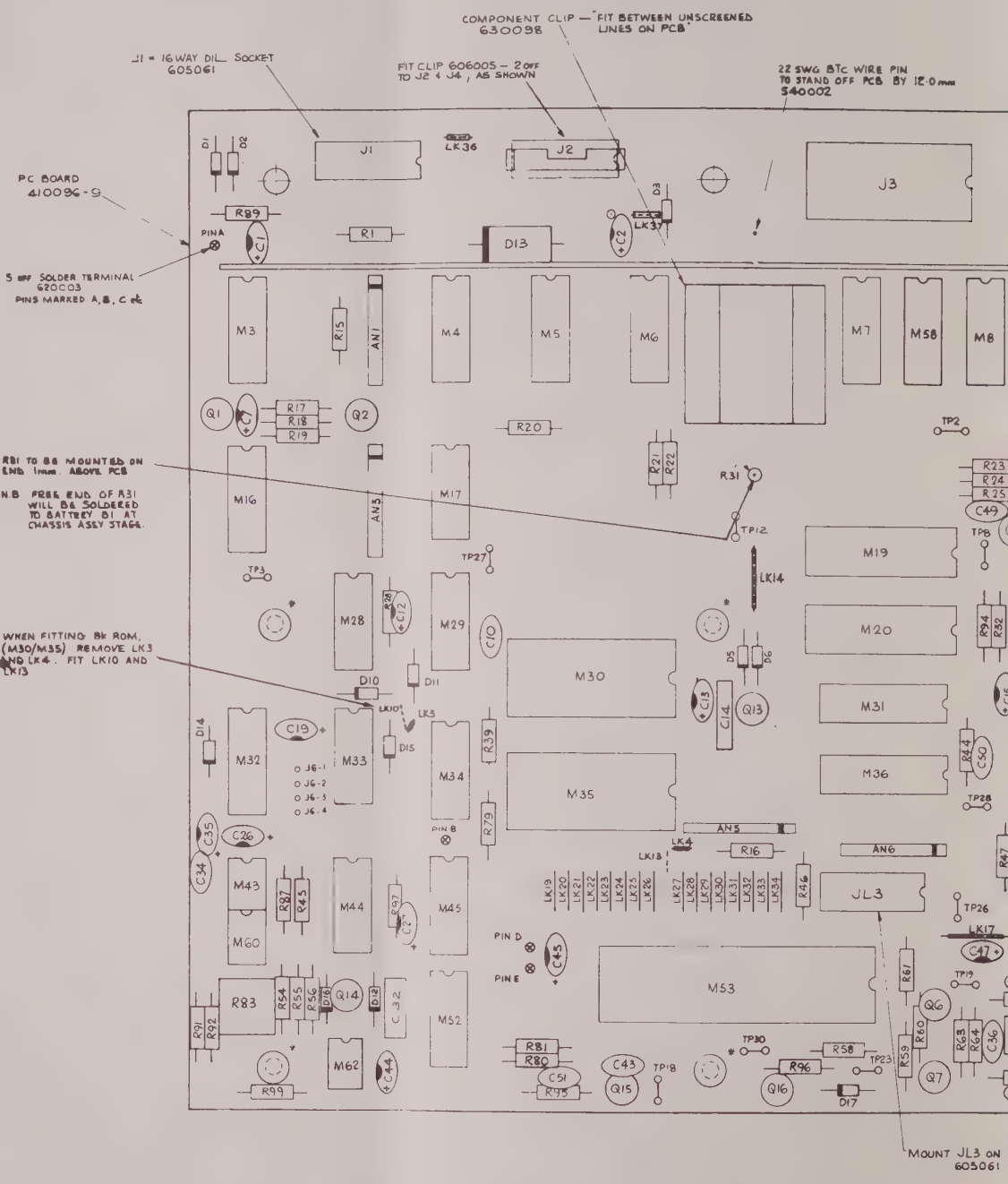
ANGULAR + °	MATERIAL	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE A1
ES + 005 CES + 010 + 1/64	FINISH	TITLE 1065 DIGITAL PCB. ASSY	DRAWING No. 400422
ES + 1mm E + 2mm S + 4mm FED			SHEET 1 OF 15

DRAWING No 400422

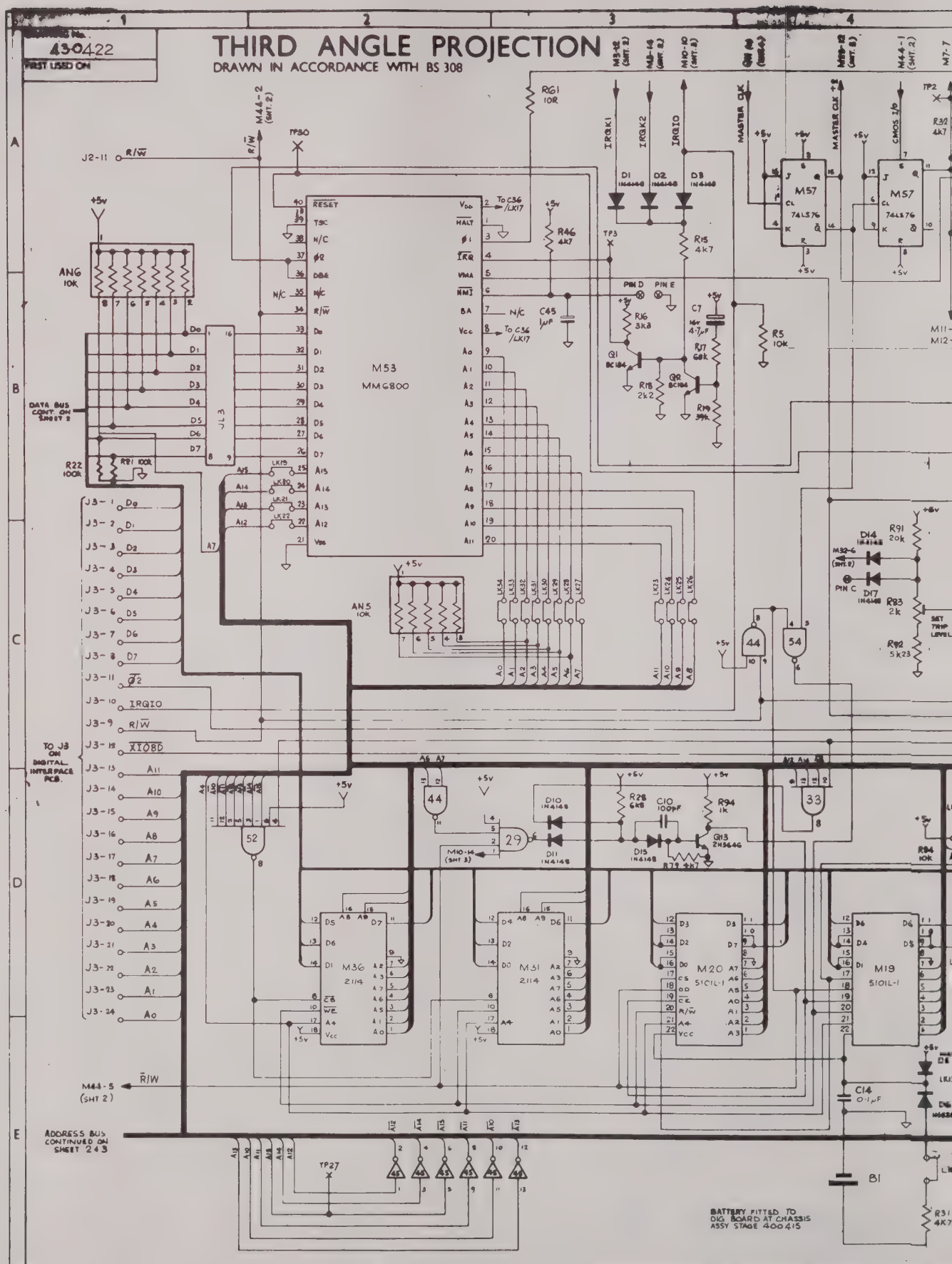
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308


J1 = 16 WAY DIL SOCKET 605061
FIT CLIP 606005 — 2 OFF TO J2 & J4, AS SHOWN
COMPONENT CLIP — "FIT BETWEEN UNSCREENED LINES ON PCB" 630098
22 SWG BTc WIRE PIN TO STAND OFF PCB BY 12·0mm 540002
PC BOARD 410096-9
5 OFF SOLDER TERMINAL 620003 PINS MARKED A, B, C etc
R81 TO 88 MOUNTED ON END 1mm. ABOVE PCB
N.B FREE END OF R31 WILL BE SOLDERED TO BATTERY B1 AT CHASSIS ASSY STAGE.
WHEN FITTING 8k ROM, (M30/M35) REMOVE LK3 AND LK4. FIT LK10 AND LK13
MOUNT JL3 ON 605061

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES
IL	MSP	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 2 DECIMAL TO 3 FRACTIONAL
TRACED	APPROVED	SCALE 2:1	METRIC DIMENSIONS DECIMAL TO 2 DECIMAL TO 1 WHOLE DIMEN
DATE 30.5.80	DATE	NOT TO BE SCALED	UNLESS OTHERWIS


430422
FIRST USED ON
THIRD ANGLE PROJECTION
DRAWN IN ACCORDANCE WITH BS 308
M53
MMG800
M36
2114
M31
2114
M20
5101L-1
M19
5101L-1
ANG
10K
AN5
10K
R22
100R
R91 100R
R61
10R
R46
4k7
R15
4k7
R5
10K
R16
3k8
R17
68k
R18
2k2
R19
39k
C7
4·7µF
C45
µF
R91
20k
R93
2k
R92
5k23
R94
1k
R95
10K
R28
6k8
C10
100pF
R79
3k7
C14
0·1µF
B1
R32
4k7
R31
4K7
IRQK1
IRQK2
IRQIO
MASTER CLK
CMOS I/O
D1
D2
D3
D14
D17
D10
D11
D15
Q1
Q2
Q13
TP1
TP2
TP3
TP27
TP30
PIN D
PIN E
J2-11
R/W
DATA BUS CONT. ON SHEET 2
TO J3 ON DIGITAL INTERFACE PCB.
J3-1
J3-2
J3-3
J3-4
J3-5
J3-6
J3-7
J3-8
J3-11
J3-10
J3-9
J3-12
J3-13
J3-14
J3-15
J3-16
J3-17
J3-18
J3-19
J3-20
J3-21
J3-22
J3-23
J3-24
IRQIO
XIOBD
M44-5 (SHT 2)
ADDRESS BUS CONTINUED ON SHEET 2&3
BATTERY FITTED TO DIG BOARD AT CHASSIS ASSY STAGE 400415

5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
A	
1	RELEASED. 1.8.80
2	ECO 1153 D21 ADDED IL 22 9.80
3	ECO. 1181, 1188. J2-10 WAS ADDRESS LINE A1 J2-11 WAS ADDRESS LINE A2 IL 5 1 80
4	ECO 1214. LK36 AND LK37 ADDED JR 12 6 81
5	ECO 1243, 1251 PCB WAS 155 68 R56 WAS 100K R45 WAS 330K M21-38 WERE 2B6 X 4 BIT RAMS JR 2 12 81

+5V LK17 C36 .01µF C47 100µF 6.3V C29 1µF 35V M54, M55 (SHT 5) R64 2k2 R66 10k Q7 2N3906 C37 22pF R59 22Ω TP20 Ø1

R68 10K R67 270R TP21 C38 220pF 54 55 56

R68 2k2 R65 10k Q6 2N3906 C28 22pF R60 22Ω TP23 Ø2 R58 10R TP12

TP26 PIN B TP19 VMA Ø2 M33-4 (SHT 2)

D12 1N4001 D16 1N4001 R97 2k2 Q14 BC184 C27 10nF C44 10nF R55 680k R56 82k C32 .068µF R45 360k C39 100pF R44 10K C51 100pF R99 100k R54 1M R90 68k R95 4k7 Q16 2N3906 R81 10k C43 100nF R96 10k Q15 2N3904

M60 ICL8211 M62 ICL8211

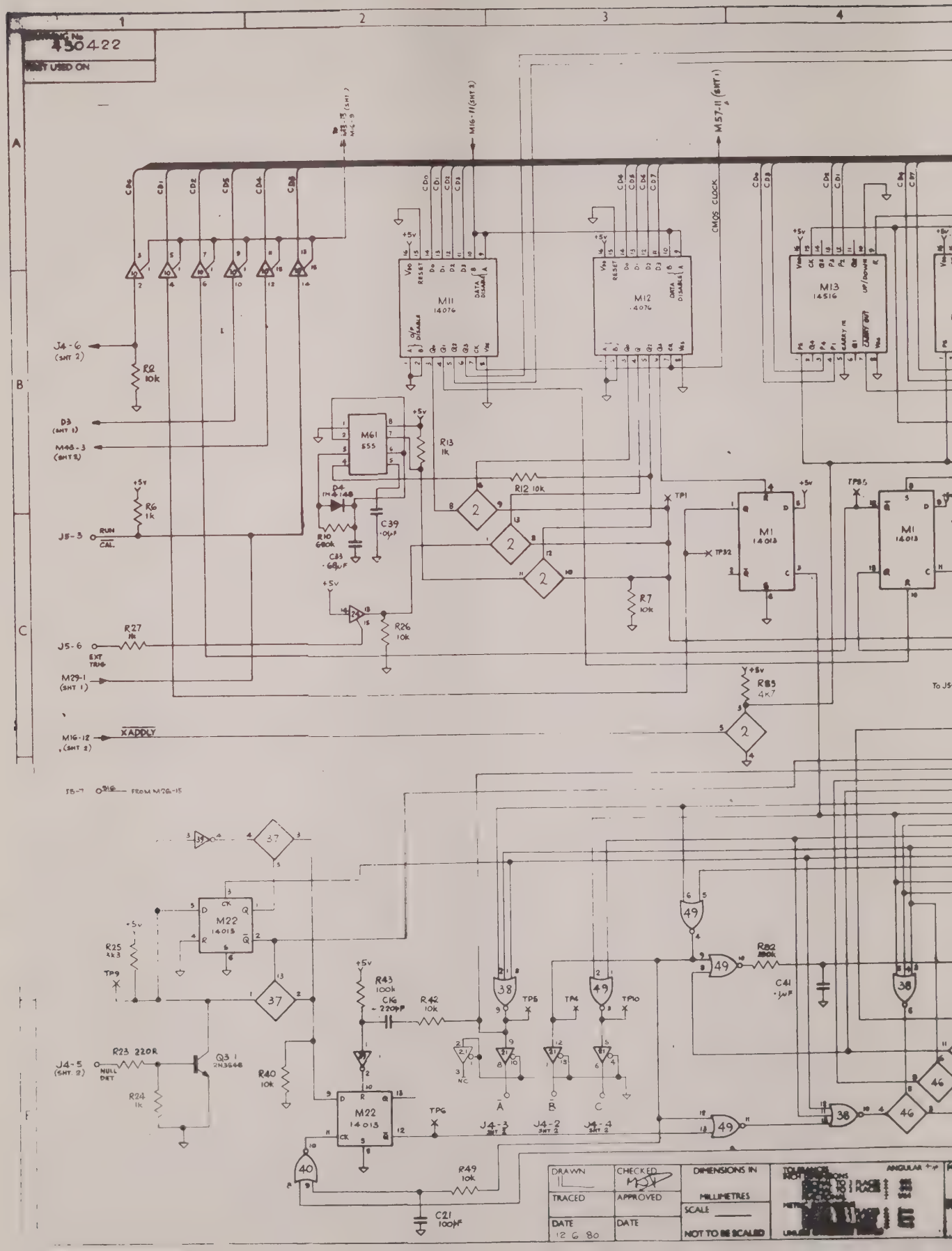
28 34 LK3

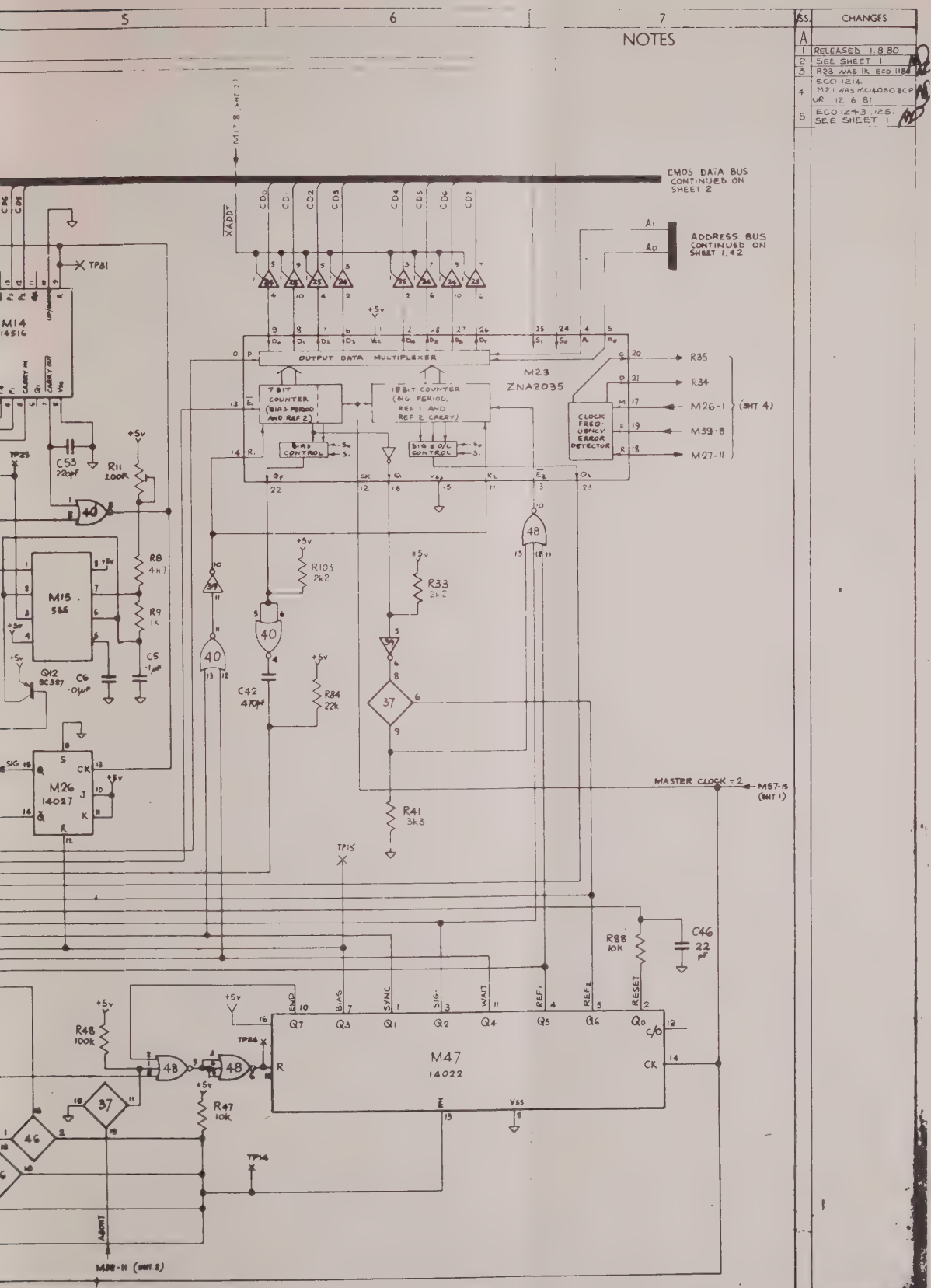
M35 2532 M30 2532 M1B 2716 (OPTIONAL)

TO J2 ON CENTRE PCB

D0 J2-1
D1 J2-2
D2 J2-3
D3 J2-4
D4 J2-5
D5 J2-6
D6 J2-7
D7 J2-8
A0 J2-9
A3 J2-12
XDDSP J2-13
Ø2 J2-14
+5V J2-15
DIG COM J2-16
R/W J2-11
TAGRQ J2-10
LK36
FROM D1 A MOD8 (SHT 1)
M29-B (SHT 2)
LK37
M1B ENABLE

DRAWN IL	DATE 12 6.80	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE A1
CHECKED MD	DATE 13.6.80	TITLE 1065 MPU & MEMORY CIRCUIT	DRAWING No 430422
APPROVED	DATE		SHEET 1 OF 5

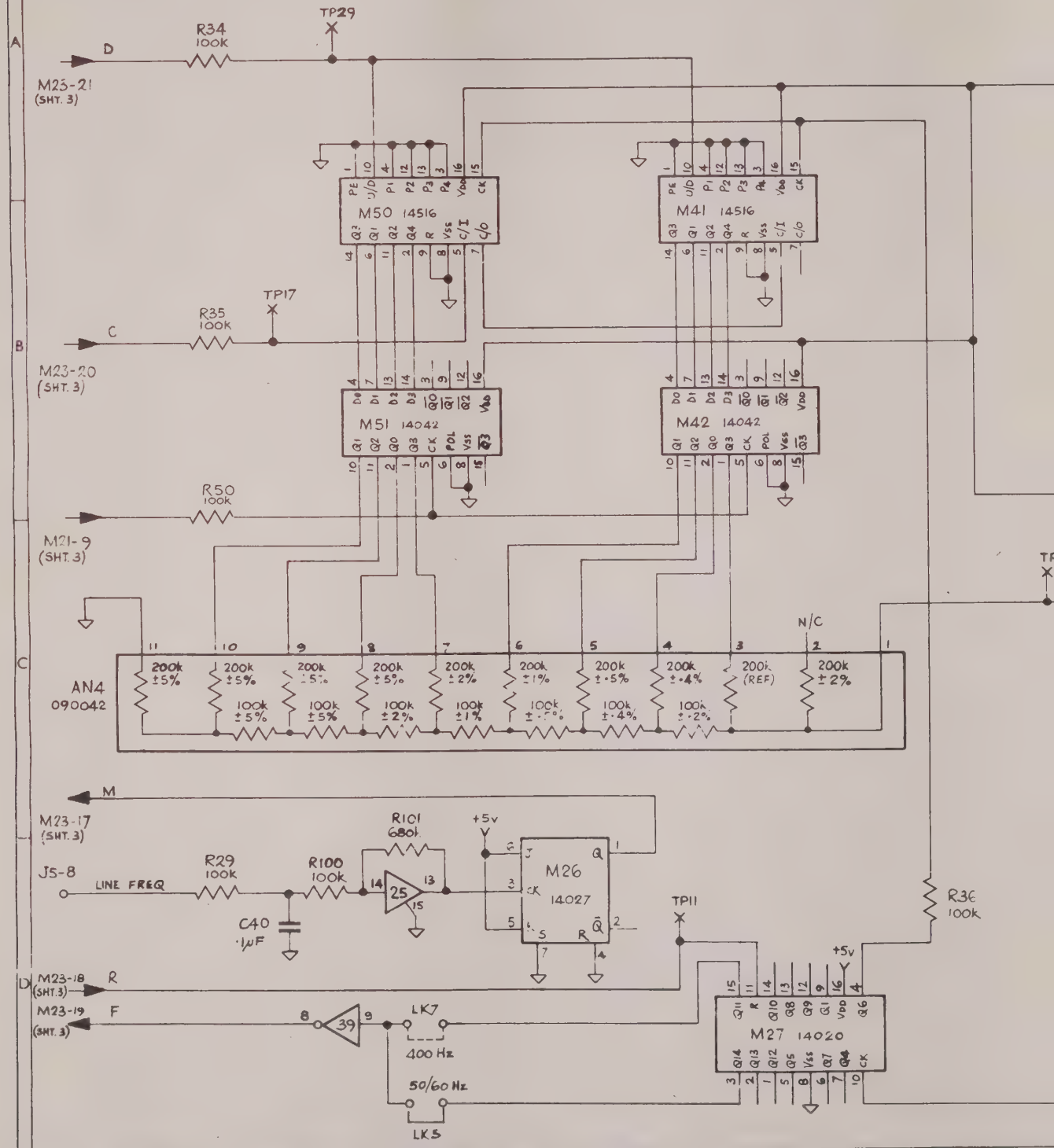

1
2
3
4
A
B
C
D
E
F
No 430422
NEXT USED ON
M16-11 (SHT 2)
M57-11 (SHT 1)
CMOS CLOCK
M11 14076
M12 4076
M13 14516
M61 555
M1 14013
M22 14013
J4-6 (SHT 2)
D3 (SHT 1)
M48-3 (SHT 2)
J5-3 RUN CAL.
J5-6 EXT TRIG
M29-1 (SHT 1)
M16-12 (SHT 2) XADDLY
J5-7
FROM M26-15
J4-5 (SHT 2) NULL DET
R2 10k
R6 1k
R7 10k
R10 680k
R12 10k
R13 1k
R23 220R
R24 1k
R25 2k3
R26 10k
R27
R40 10k
R42 10k
R43 100k
R49 10k
C21 100pF
C33 .68µF
C39 .01µF
C41 .1µF
Q3 2N3646
TP1
TP2
TP5
TP6
TP9
TP10
J4-3 (SHT 2)
J4-2 (SHT 2)
J4-1 (SHT 2)
To J5
DRAWN
CHECKED
TRACED
APPROVED
DATE 12 6 80
DATE
DIMENSIONS IN MILLIMETRES
SCALE
NOT TO BE SCALED
TOLERANCES
ANGULAR


NOTES
CHANGES
RELEASED 1.8.80
SEE SHEET 1
R23 WAS 1K ECO 1184
ECO 1214. M2.1 WAS MC14053CP OR 12 6 81
ECO 1243 1251 SEE SHEET 1
CMOS DATA BUS CONTINUED ON SHEET 2
ADDRESS BUS CONTINUED ON SHEET 1.42
XADDT
OUTPUT DATA MULTIPLEXER
M23 ZNA2035
7 BIT COUNTER (BIAS PERIOD AND REF 2)
18 BIT COUNTER (BIG PERIOD, REF 1 AND REF 2 CARRY)
CLOCK FREQUENCY ERROR DETECTOR
R35
R34
M26-1 (SHT 4)
M39-8
M27-11
M14 14516
M15 555
M26 14027
M47 14022
R88 10K
C46 22 pF
R48 100k
R47 10K
R41 3k3
R84 22k
R103 2k2
R33 2k2
C42 470pF
C53 220pF
R11 200K
R8 4k7
R9 1k
C5 .1µF
C6 .01µF
Q12 BC337
MASTER CLOCK ÷2
M57-15 (SHT 1)
TP81
TP84
TP85
TP86
TP14
ABORT
M28-11 (SHT 2)
datron ELECTRONICS LTD. NORWICH.
1065 A-D CONVERTER
DRAWING No. 420422
A1

DRAWING No
430422
FIRST USED ON

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



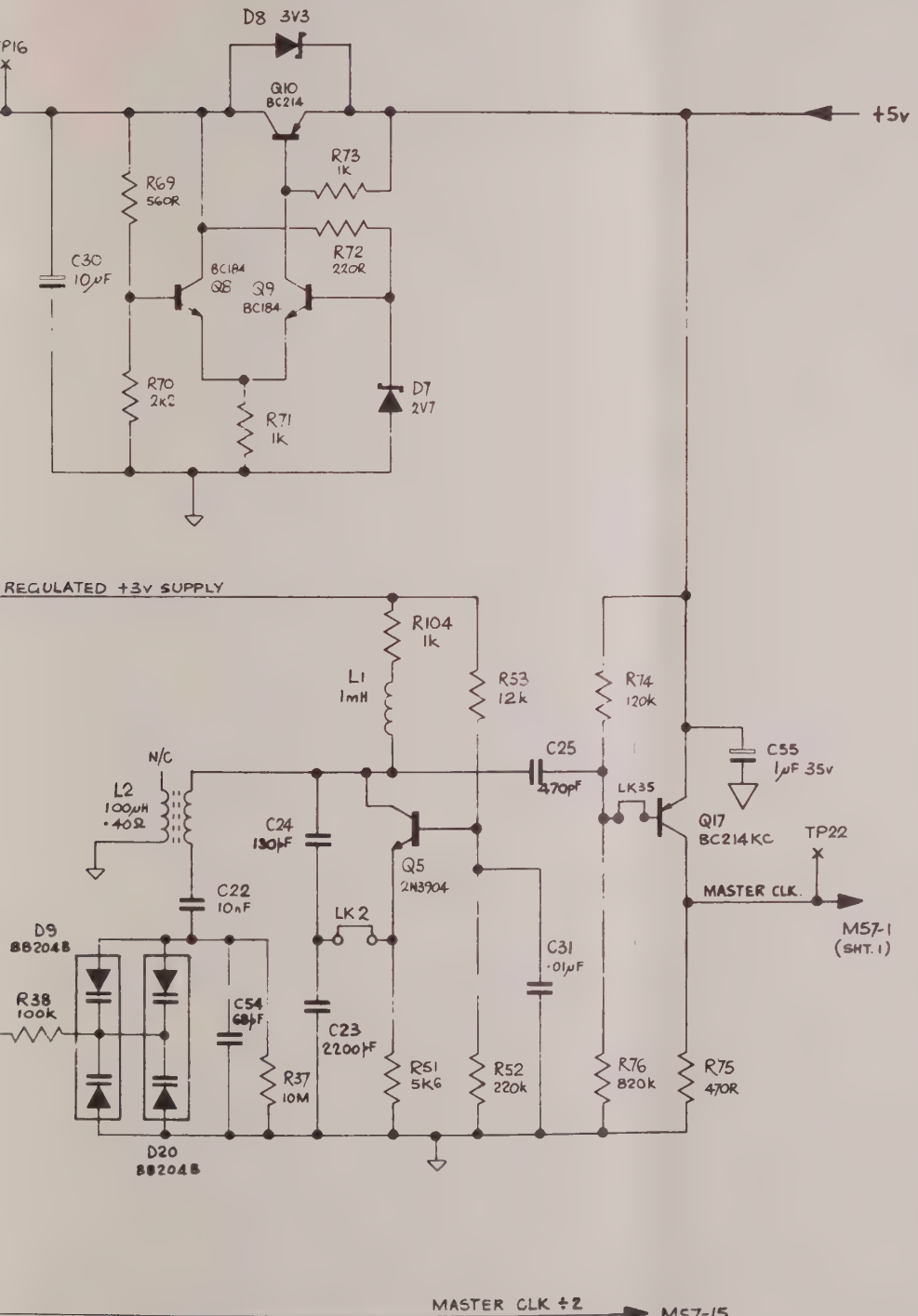
DRAWN IL	CHECKED MJD	DIMENSIONS IN	TOLERANCES ANGULAR ° INCH DIMENSIONS DECIMAL TO 1 PLACES ± .00" DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm UNLESS OTHERWISE STATED	MATERIAL
TRACED	APPROVED	MILLIMETRES		
DATE 12.6.80	DATE	SCALE NOT TO BE SCALED		FINISH

4 | 5 | 6

BURRS TO BE REMOVED

NOTES

ISS	
A	
1	RELEASED 1.12.80
2	SEE SHEET 1
3	SEE SHEETS 1,2,3,5
4	ECO 1214 SEE SHEETS 1,3,5
5	ECO 1243,1251 SEE SHEET 1



datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

TITLE 1065 LINE LOCKING CIRCUIT

DRAWING No. 430422

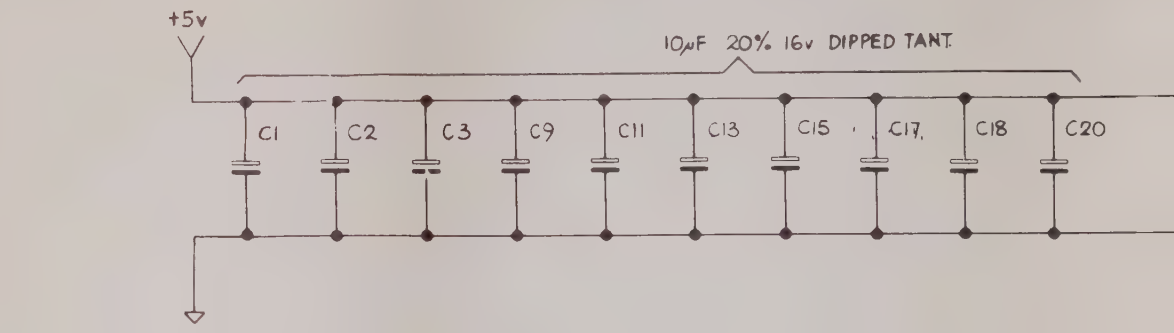
SHEET 4 OF 5

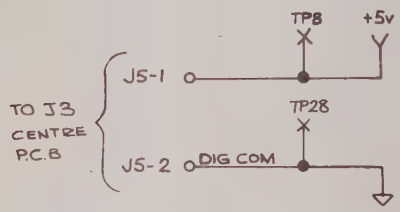
DRAWING No.
430422
FIRST USED ON

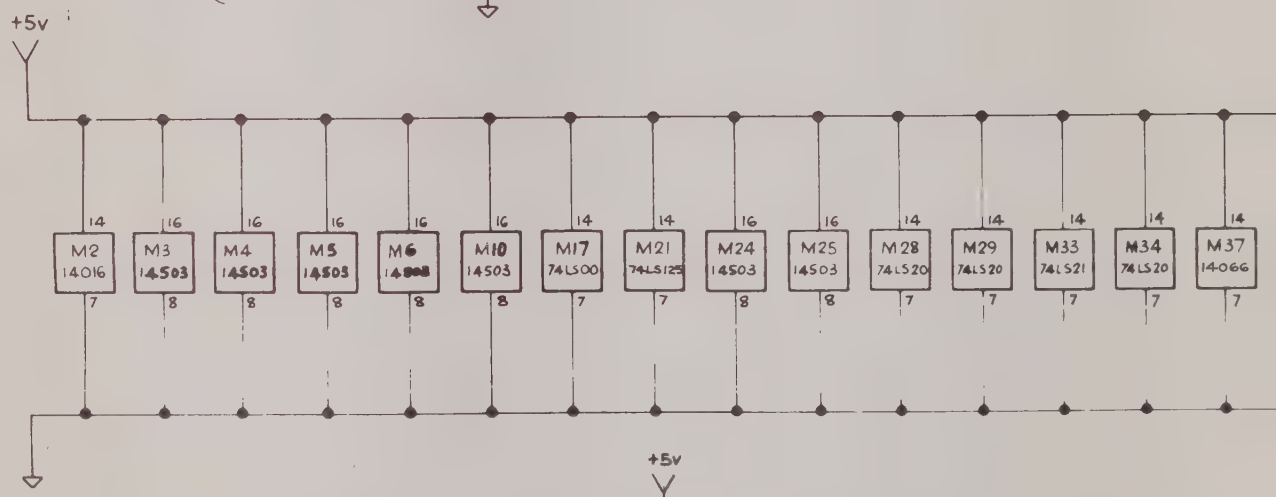
THIRD ANGLE PROJECTION

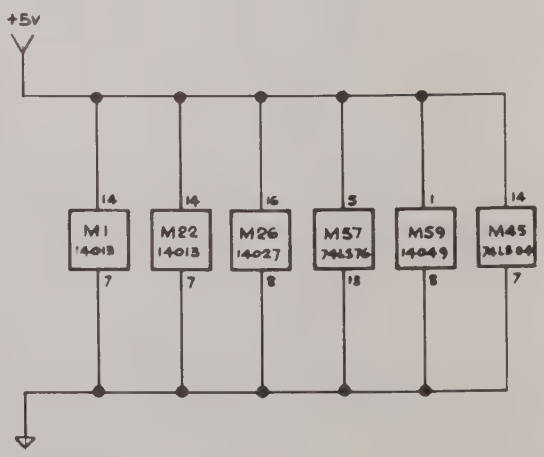
DRAWN IN ACCORDANCE WITH BS 308

ALL









ALL RESISTORS : 5% ¼ WATT CARBON

DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	MATERIAL
TRACED	APPROVED	MILLIMETRES	INCH DIMENSIONS	
12.6.80		SCALE		

RRS TO BE REMOVED

NOTES

A	
1	RELEASED 1.8.80
2	SEE SHEET 1
3	M28 WAS 74LS21 IL 5.1.81
4	ECO 1214 M21 WAS 14050 JR 12.6.81
5	ECO 1243, 1251 SEE SHEET 1

1μF 20% 35v DIPPED TANT

C4 C12 C19 C26 C49 .01μF D13 TVS505

TO LK17 (SHT. 1)

14	14	14	14	14	14	14	14	14	14	14	1
M38 HEF 4025P	M39 14069	M40 HEF 4001 BP	M44 74LS00	M45 14066	M48 HEF 4025 P	M49 14001	M52 74LS30	M54 7437	M55 74LS08	M56 74LS08	M58 14050
7	7	7	7	7	7	7	7	7	7	7	8

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A2

1065 DIGITAL PCB. ASSY.

DRAWING No. 430422

5 5

DRAWING No. 400425

FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308

NOTE. WIRES OF J2 SOCKET TO BE AS SHOWN

GUARD SHIELD 450249 TO BE SECURED WITH M3 X 6 ... POZI-CSK SCREWS G11007 3 OFF TO M3 HEX STANDOFFS

ALL TEST LINKS TO BE FORMED AS TEST POINTS

BRASS STRIP 85mm LONG 63(
N.B. STRIP SHOULD BE SOLDER
AS CLOSE AS POSSIBLE TO LE
HAND SIDE OF COPPER LAND
SHOWN). ENSURE THAT SO
DOES NOT ENCROUCH ON ARE
AROUND HEX STANDOFF P
STRIP SHOULD ALSO BE 3.0mm FRO
OF BOARD TO CLEAR PCB TRACK

PCB 410136-1

CUT THIS TRACK ON COMPONENT SIDE OF PCB

2 OFF FSV TERMINAL 602001

1 OFF 16 WAY RIBBON CABLE ASSY 571095/C SOLDER END WITHOUT CABLE CLIP TO PC B

ALL TEST POINTS & TEST LINKS USE 22 SWG BTC WIRE 540002

MOUNT M6 ON BREAKAWAY TERMINAL STRIPS 602004 - 16 OFF

MOUNT M3, M4 & M7 ON 16 WAY DIL SOCKET - 3 OFF 605061

LINK PINS 11 & 12 ON M4 540002 (BTC WIRE) SOLDER ON UNDERSIDE

MOUNT M5 ON 14 WAY DIL SOCKET 605060

* NYLATCH GROMMET 617011 - 4 OFF

* NYLATCH PLUNGER 617010 - 4 OFF
N.B. FIT FROM COMPONENT SIDE OF PCB

SECTION A-A

CONNECT C71 & R130 IN SERIES SOLDER BETWEEN Q18 & C34

NOTE:-
FIT ESOG AS SHOWN ON DR
FIT TCR50G AS SHOWN WITH FLAT AT TOP

VIEW IN

DRAWN IL	CHECKED PRG	DIMENSIONS IN MILLIMETRES	TOLERANCES INCH DIMENSIONS DECIMAL TO 3 PLACE DECIMAL TO 2 PLACES FRACTIONAL METRIC DIMENSIONS DECIMAL TO 2 PLACES DECIMAL TO 1 PLACE WHOLE DIMENSIONS UNLESS OTHERWISE STATED
DATE 17.7.80	APPROVED DATE 22.7.80	SCALE 2:1 NOT TO BE SCALED	

5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

ISS	CHANGES
A	
B	PARTS LIST CHANGES TO R25, C18, C22 & C23 IL 24.7.80
1	RELEASED 1.8.80
2	ECO 1150 1152 1155 1162 R138 ADDED, STEATITE BEADS (MTG. DIL) DELETED. PARTS LIST CHANGES IL 8.9.80
3	ECO 1202 C34 DELETED. Pts LT. VALUE CHANGES IL 6.4.81
4	ECO 1217 J1 WAS 16 WAY SOCKET. OR 19.8.81
5	ECO 1233 Nº CLOVERLEAFS WAS 12 R139 ADDED, IN SERIES WITH HI LEAD VIA CLOVERLEAFS IL 28.10.81

R134 CONNECTED IN SERIES WITH C57 & SOLDERED INTO CLOVERLEAF AS SHOWN

'A'

SLEEVE ALL SOLDERED JOINTS WITH HALF PIECE OF 590001

ALL WIRES TO RELAY PINS 7/.2 PTFE INSULATED - WHITE 540008

2 OFF SOLDER TERMINAL 620003

CRIMP TERMINAL (FOR BLANKING ONLY) 605056

25mm

R133 SOLDERED BETWEEN RL3 PINS 7 & 10 LEADS SLEEVED WITH 590001

VIEW ON BASE OF RELAY RL3

WIRE, TERMINAL ASSY 400375/1

55 mm

150 mm

WIRE PTFE INSULATED 7/0.2 WHITE 540008, PLUS GOLD CRIMP TERMINAL 605057 FITTED AS SHOWN

8 WAY POLARISED SOCKET 602052

LINK C57 TO R123 VIA CLOVERLEAF TERMINALS USING SLEEVED LINKS 540002 590004

BRASS STRIP 35 mm LONG BUTT END OF STRIP TO ADJOINING 85mm STRIP AND SOLDER AS SHOWN

FIT C49, C51, C58, C59, C60 (GLASS CAPS) TO PCB MOUNTED ON THIN END

14 OFF CLOVERLEAF 620005

N.B. TERMINALS SHOULD BE FITTED WITH SOLDER CUPS ON X-Y AXIS AS SHOWN

3-48 UNC NUT 615005 2OFF
M2.5 WASHER 613014 2OFF

M3 x 8 P/PAN SCREW 611016 2OFF
M3 NUT 615002 2OFF
M3 SHAKEPROOF 613005 2OFF

RELAY BRACKET 459112 2OFF

3 OFF M3 STANDOFF 612021
SECURE FROM UNDERSIDE WITH M3 X 8 P/PAN SCREW 611016 3OFF
M3 SHAKEPROOF 613005 3OFF

SOLDER WIRE ENDS TO SOLDER TERMINALS & SLEEVE WITH ½ PIECE OF 590001

SOLDER WIRE LINK BETWEEN RELAY COIL TERMINAL 4 PCB AS SHOWN (IN SAME POSITION ON RL2 & RL3. 540002

To J2

N.B. ENSURE THAT IDENT MARK IS AT TOP, AS SHOWN

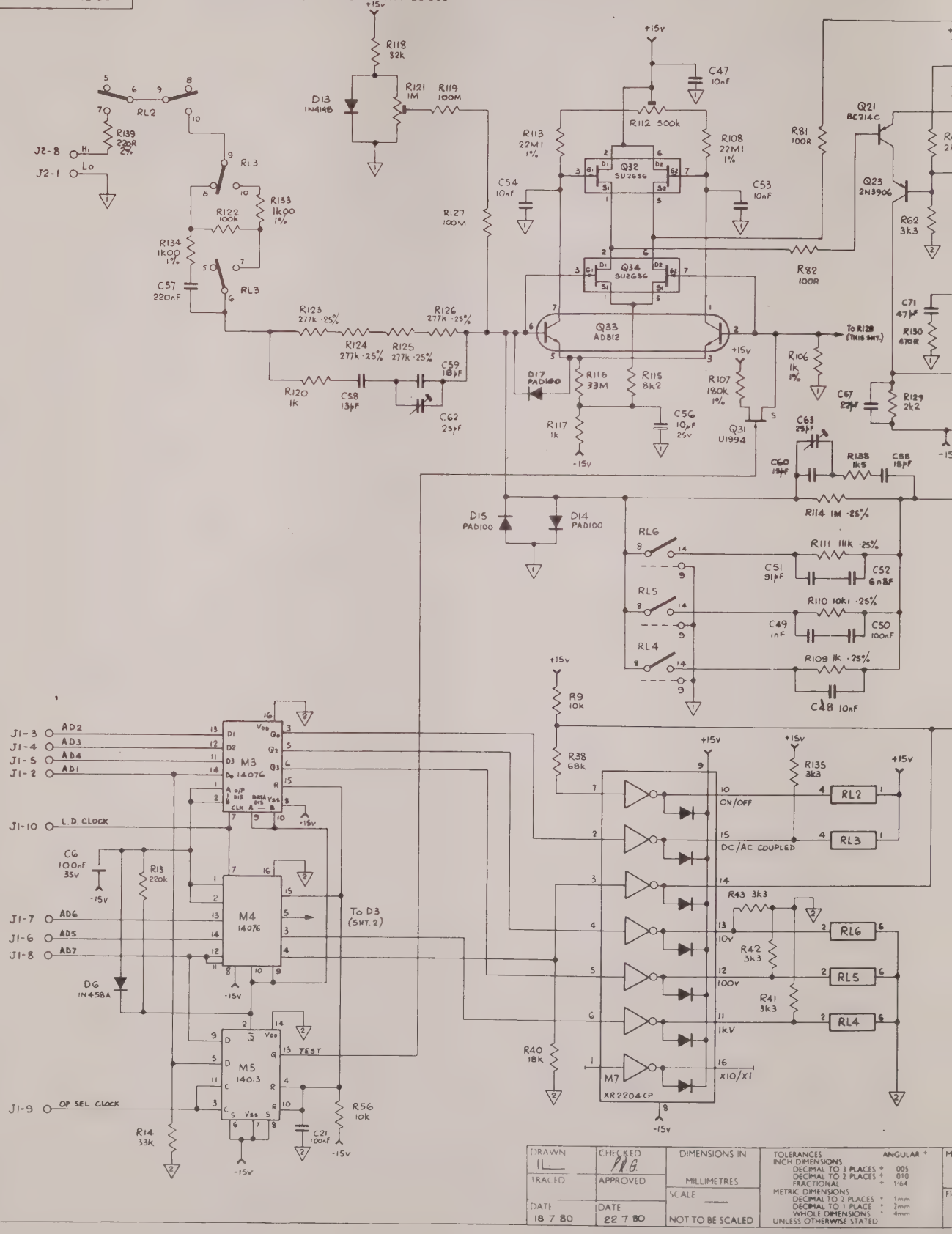
VIEW IN DIRECTION OF ARROW 'A'
SHOWING ONLY RELAY WIRING

ANGULAR ± ° 005 010 1/64 1mm 2mm 4mm	MATERIAL AS PARTS LIST	datron ELECTRONICS LTD. NORWICH.	DRAWING SIZE A1
	FINISH ——	TITLE AC PCB ASSY 1065	DRAWING No 400425 SHEET 1 OF 16

DRAWING No. 430425
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



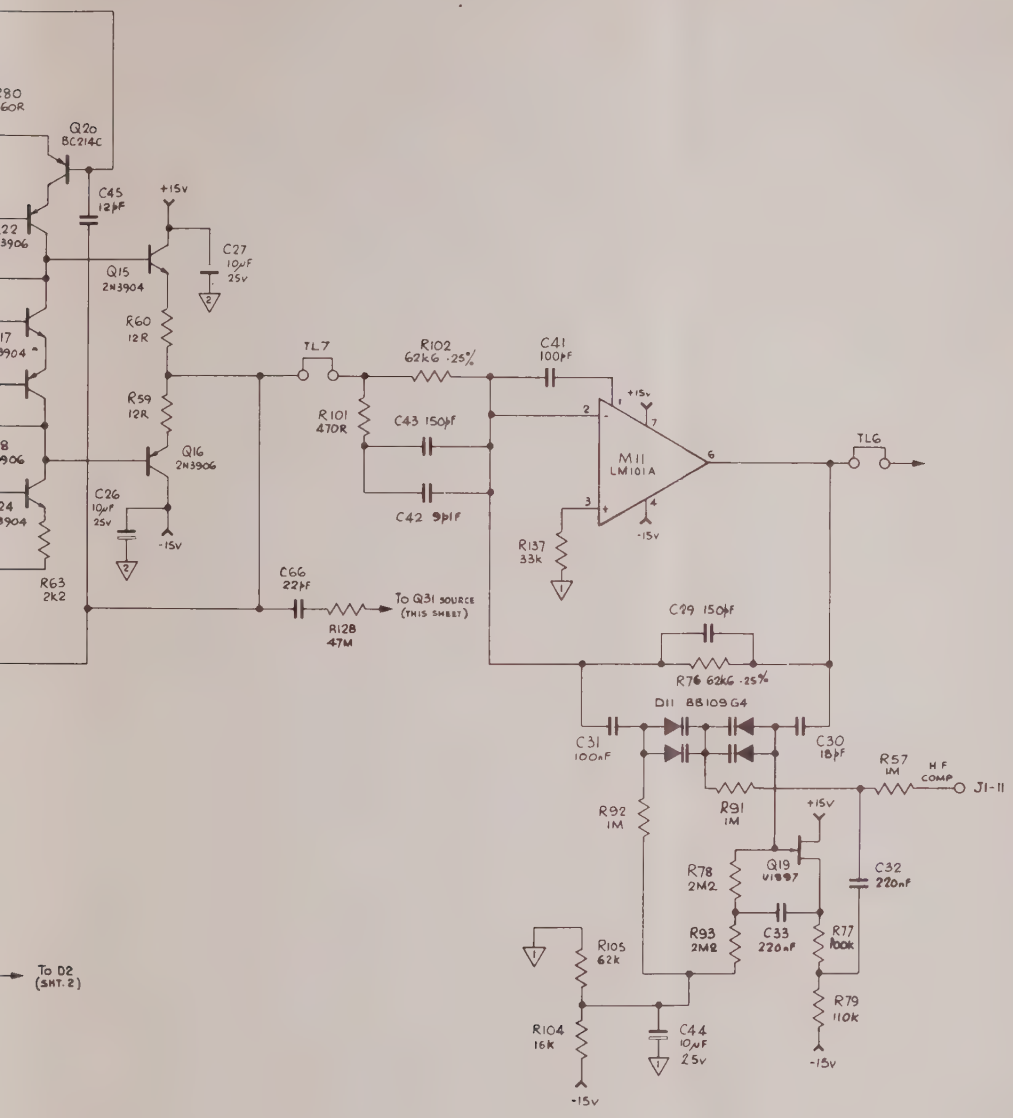
DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	ANGULAR °
IL	RJG	MILLIMETRES	INCH DIMENSIONS	
TRACED	APPROVED	SCALE	DECIMAL TO 3 PLACES ± .005	
DATE 18 7 80	DATE 22 7 80	NOT TO BE SCALED	DECIMAL TO 2 PLACES ± .010	
			FRACTIONAL ± 1/64	
			METRIC DIMENSIONS	
			DECIMAL TO 2 PLACES ± 1mm	
			DECIMAL TO 1 PLACE ± 2mm	
			WHOLE DIMENSIONS ± 4mm	
			UNLESS OTHERWISE STATED	

5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
A	
B	SEE SHT. 2
1	RELEASED 1.8.80
2	ECO 1150 1152 1162. Q32 + Q34 WERE 2N3906. C59 WAS 15pF. R138 (1K8) ADDED IL 22.9.80
3	ECO 1202. C34 DELETED. C45 WAS 10µF C71 WAS 33pF IL 6.4.81
4	ECO 1233. R135 ADDED. IL 28.10.81



RIAL

datron ELECTRONICS LTD. NORWICH.

DRAWING SIZE A1

TITLE 1065 AC - PREAMP

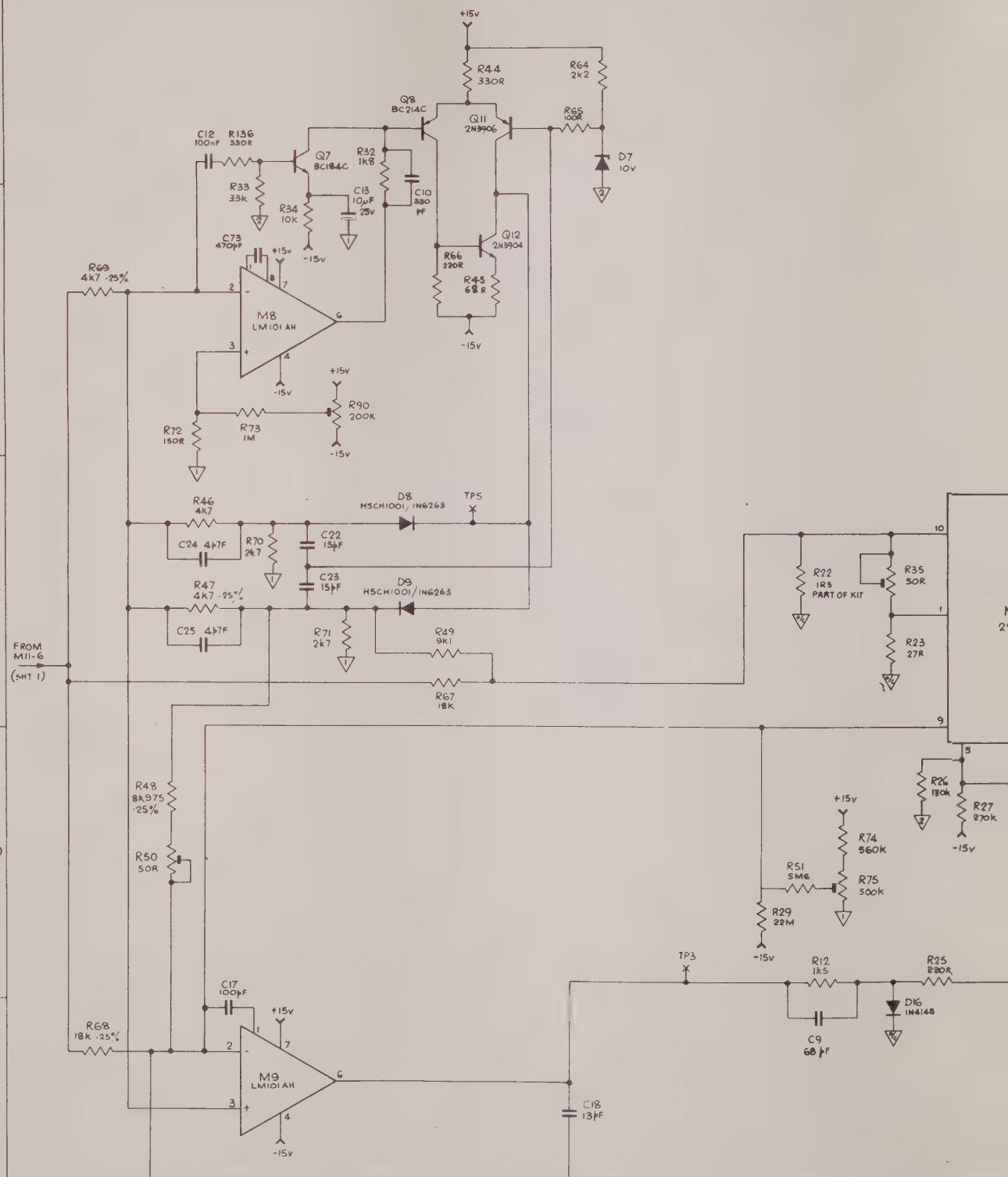
DRAWING No. 430425

SHEET 1 OF 2

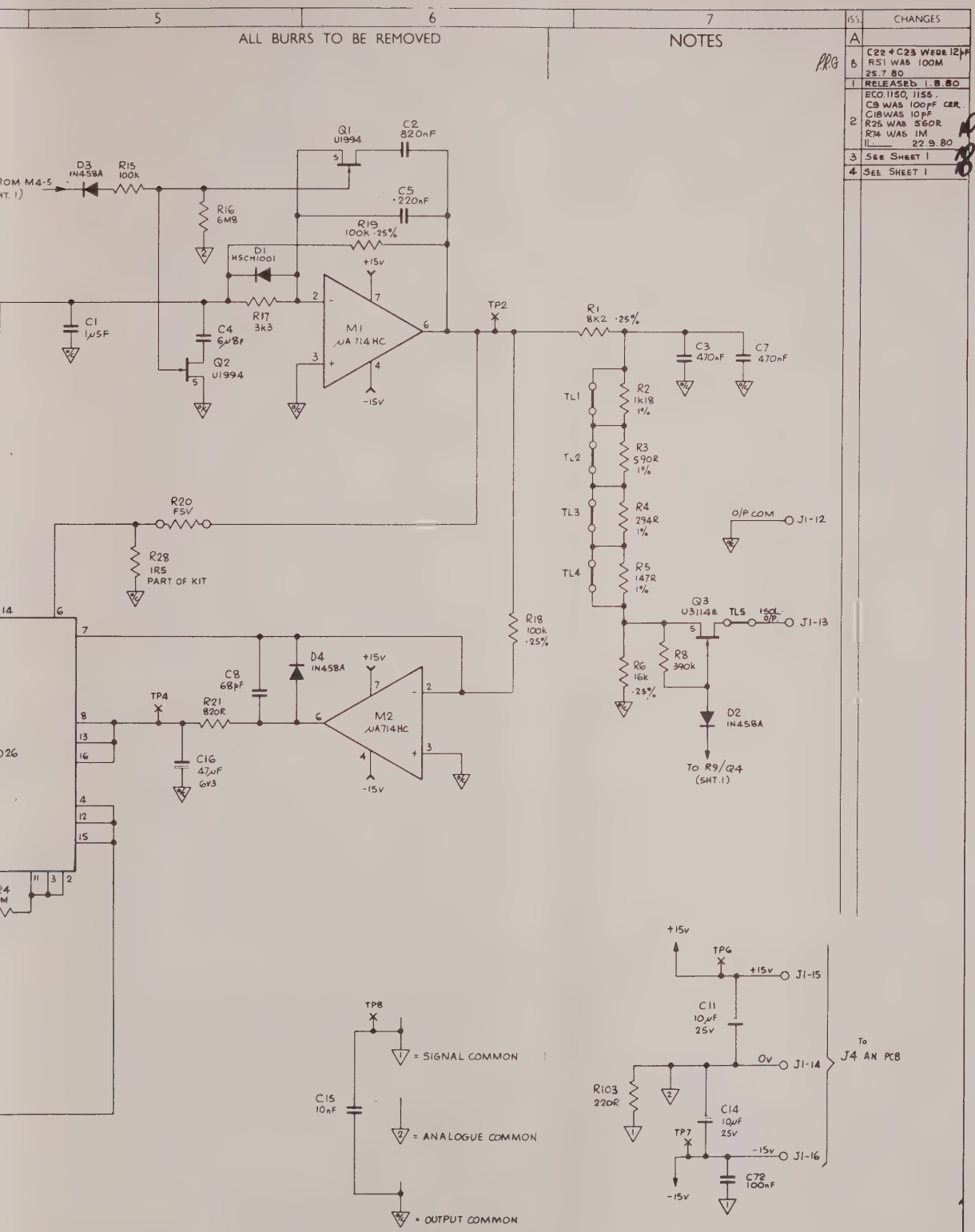
DRAWING No
430425
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	ANGULAR
IL	PRG	MILLIMETRES	INCH DIMENSIONS	
TRACED	APPROVED	SCALE	DECIMAL TO 3 PLACES ±	00°
			DECIMAL TO 2 PLACES ±	0°0
DATE	DATE	NOT TO BE SCALED	FRACTIONAL ±	1/64
18 7 80	22 7 80		METRIC DIMENSIONS	
			DECIMAL TO 2 PLACES ±	1mm
			DECIMAL TO 1 PLACE ±	2mm
			WHOLE DIMENSIONS ±	4mm
			UNLESS OTHERWISE STATED	

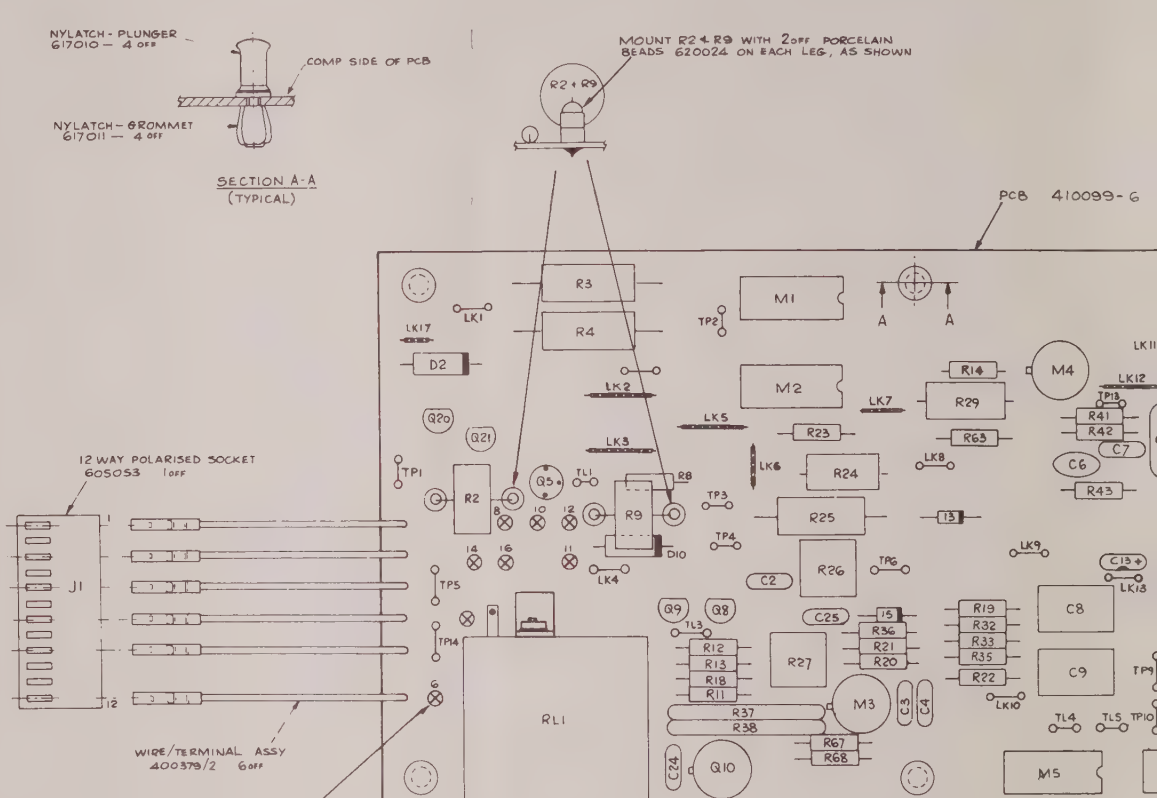


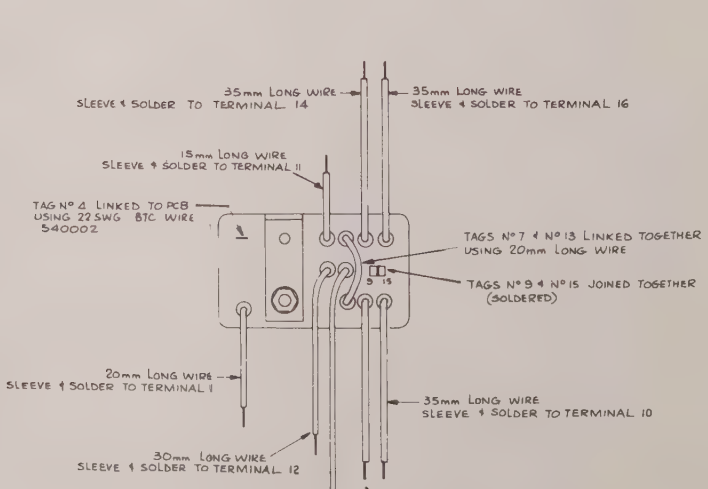
MATERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
FINISH	TITLE 1065 A.C. RMS SECTION.	DRAWING No. 430425	SHEET 2 of 2

DRAWING No. 400426
FIRST USED ON 1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308




35mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 14
35mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 16
15mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 11
TAG Nº 4 LINKED TO PCB USING 22 SWG BTC WIRE 540002
TAGS Nº 7 & Nº 13 LINKED TOGETHER USING 20mm LONG WIRE
TAGS Nº 9 & Nº 15 JOINED TOGETHER (SOLDERED)
20mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 1
35mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 10
30mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 12
35mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 8
55mm LONG WIRE SLEEVE & SOLDER TO TERMINAL 6

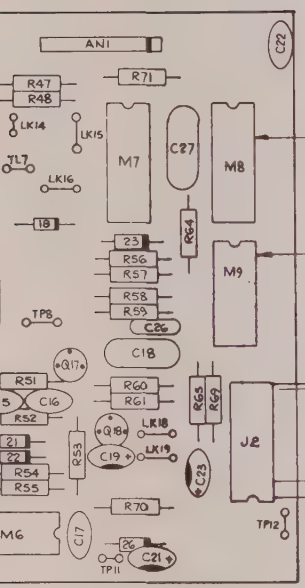
DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES
IL	RAJ	MILLIMETRES	INCH DIMENSIONS DECIMAL TO 3 PLACES ±.005 DECIMAL TO 2 PLACES ±.01 FRACTIONAL ± 1/64
TRACED	APPROVED	SCALE 2:1	METRIC DIMENSIONS DECIMAL TO 2 PLACES ±0.25 DECIMAL TO 1 PLACE ±0.1 WHOLE DIMENSIONS ±0.5
DATE 17.7.80	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED

5	6	7

ALL BURRS TO BE REMOVED

NOTES

NOTE ! ALL WIRE IS 540008 PTFE INSULATED - WHITE
ALL WIRE LENGTHS SHOWN ON RELAY ARE TOTAL LENGTHS. 4mm IS TO BE STRIPPED FROM EACH END
SLEEVE WIRES WITH 590001 (½ PIECE) FOR EACH CONNECTION. i.e. 1 PIECE FOR EACH WIRE



MOUNT M7 & M8 ON 16 WAY DIL SOCKET 605081 2off

MOUNT M1, M2, M5, M6 & M9 ON 14 WAY DIL SOCKET 605060 5off

1 OFF 16 WAY RIBBON CABLE ASSY $71085/C SOLDER END WITHOUT CABLE CLIP TO P.C.B

ALL TEST POINTS TO BE MADE FROM 22 SWG BTC WIRE 540002

NB SOME LINK SHOWN AS TEST POINT LOOPS SHOULD ALSO BE FORMED THUS, FOR EASE OF PRODUCTION (e.g LK1)

ALL SINGLE FET LEGS IN THE ORDER SHOWN

ALL TRANSISTOR LEGS IN THE ORDER SHOWN

ISS.	CHA
B	
1	RELEASED
2	ECO 1164 PCB WAS LK20 ADDE IL 24
3	ECO. 1177 LK20 DELE FURTHER PA CHANGES. F IL 16
4	ECO 1217 J2 WAS 16 SOCKET. J2 16

ANGULAR ± °
.005
.010
1/64
1mm
2mm
4mm

MATERIAL ———

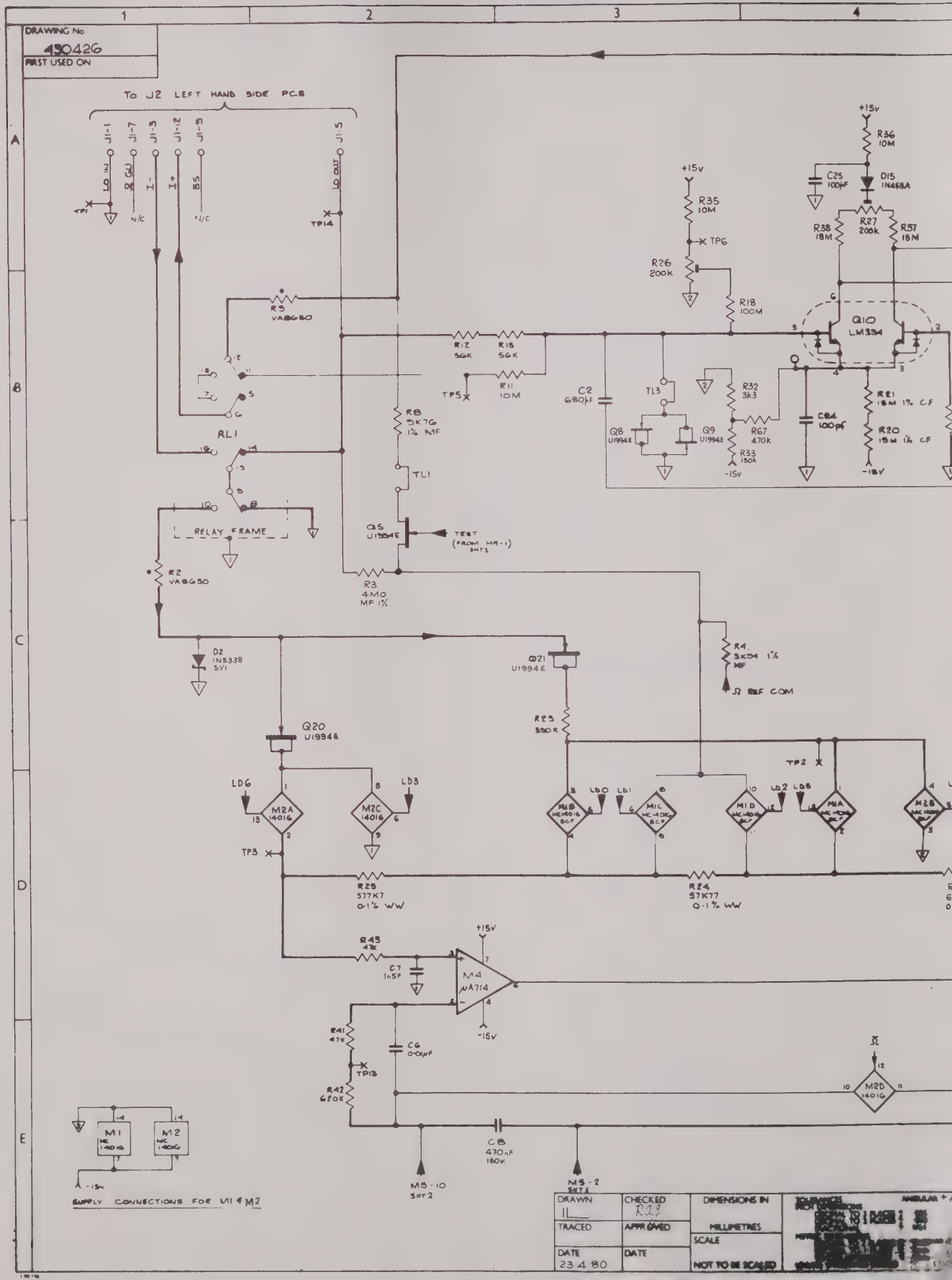
FINISH ———

datron ELECTRONICS LTD. NORWICH.

TITLE 1065 OHMS PCB. ASSY.

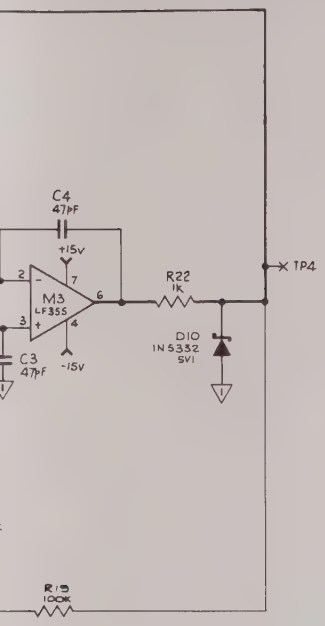
DRAWING No. 400426

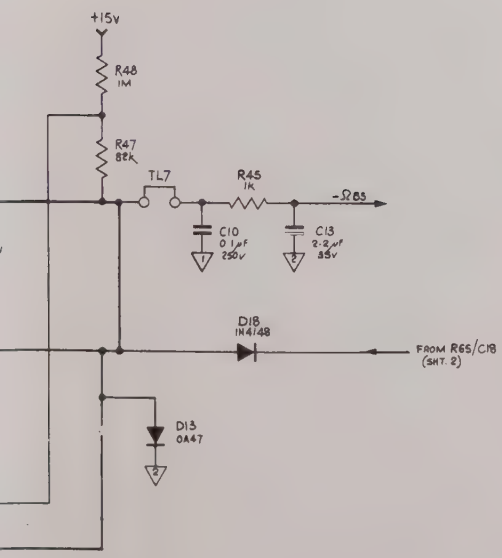
DRAWING A1


DRAWING No
430426
FIRST USED ON
TO J2 LEFT HAND SIDE PCB
J1-1
J1-7
J1-3
J1-12
J1-9
J1-5
LO IN
SIG
I-
I+
BS
LO OUT
TP1
TP14
N/C
+I/C
+15v
R36 10M
C25 100pF
D15 IN4584A
R35 10M
TP6
R26 200k
R38 18M
R27 200k
R37 18M
R18 100M
Q10 LM394
R5 VA8G50
R12 56K
R13 56K
R11 10M
TP5
C2 680pF
TL3
R32 3k3
Q8 U1994E
Q9 U1994E
R67 470k
R33 150k
-15v
C84 100pF
R21 18M 1% CF
R20 18M 1% CF
-18V
RL1
R8 5K76 1% MF
TL1
RELAY FRAME
Q5 U1994E
TEST (FROM M9-1 SHT1)
R2 VA8G50
R3 4M0 MF 1%
D2 IN5338 5V1
Q21 U1994E
R4 5K04 1% MF
Ω REF COM
Q20 U1994E
R23 330R
TP2
LDG
LD3
M2A 14016
M2C 14016
LD0
LD1
LD2
LD5
TP3
R25 577K7 0·1% WW
R24 57K77 0·1% WW
R43 47K
C7 1nSF
M4 μA714
-15v
R41 47K
C6 0·01μF
TP13
R42 6F0K
M2D 14016
C8 470nF 160V
M3-10 SHT2
M3-2 SHT4
M1
M2
-15v
SUPPLY CONNECTIONS FOR M1 & M2
DRAWN
IL
CHECKED
RJ
TRACED
APPROVED
DATE
23 4 80
DATE
DIMENSIONS IN
MILLIMETRES
SCALE
NOT TO BE SCALED

5	6	7
	ALL BURRS TO BE REMOVED	NOTES

ISS	CHANGES
A	
1	RELEASED 1/8/80
2	ECO 1177 R26 WAS 20k R35 WAS 1M2 IL 16.12.80



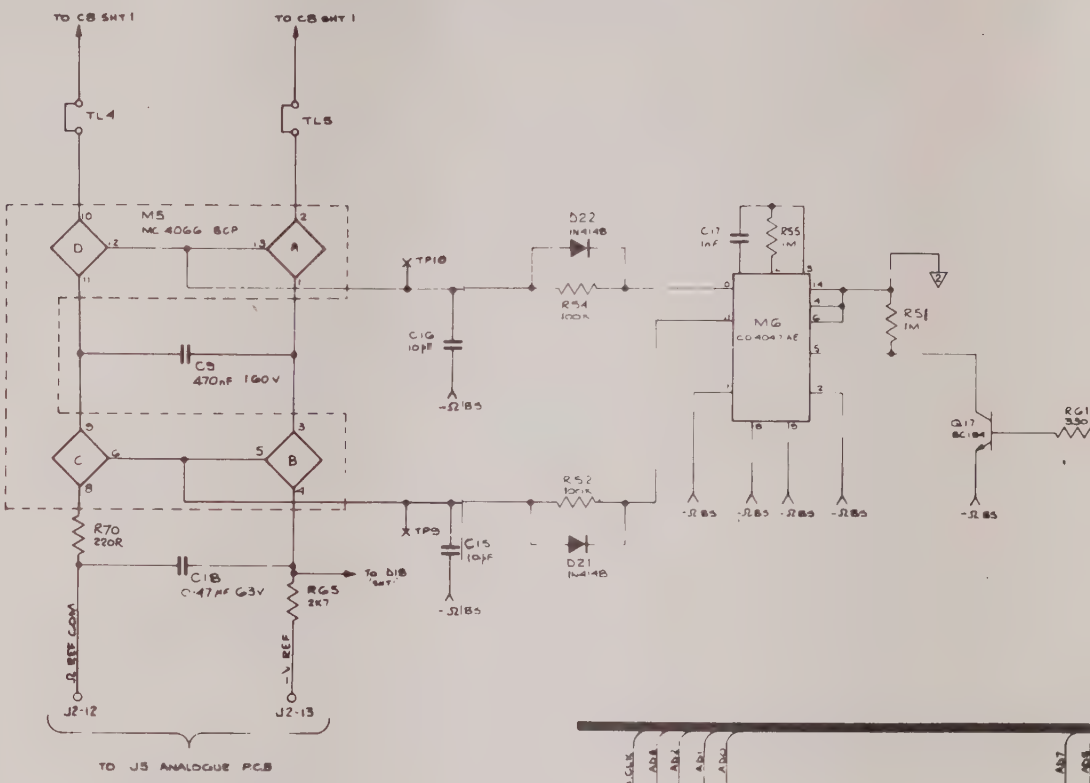


	datron ELECTRONICS LTD. NORWICH.	A1
	TITLE PCB CIRCUIT 1065	DRAWING No. 426

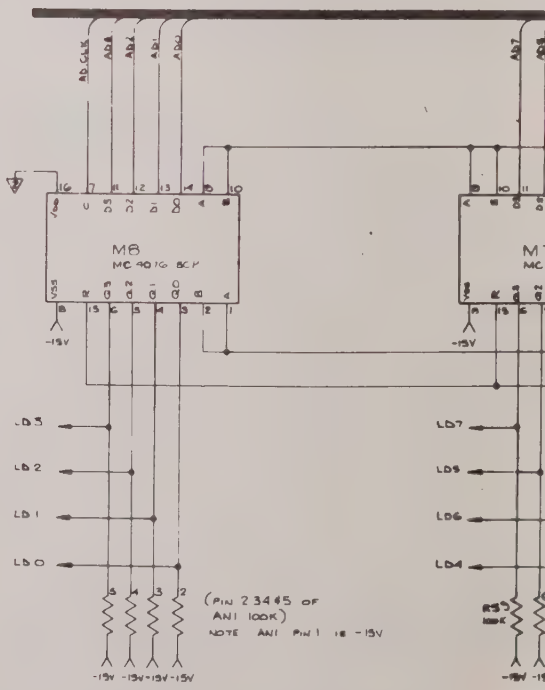
DRAWING No.	
430426	
NEXT USED ON	
1065	

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



SUPPLY CONNECTIONS TO M5



RANGE TRUTH TABLE

RANGE	LD0	LD1	LD2	LD3	LD4	LD5	LD6
100Ω	0	0	0	0	0	1	0
1KΩ	0	0	0	0	0	1	0
10KΩ	1	0	0	0	0	0	0
100KΩ	0	0	0	0	1	0	1
1MΩ	0	0	1	1	1	0	0
10MΩ	0	1	0	1	1	0	0
X	0	0	0	0	0	0	0

LOGIC '0' = -15V
LOGIC '1' = 0V
LOGIC 'X' = 'DONT CARE' CONDITION

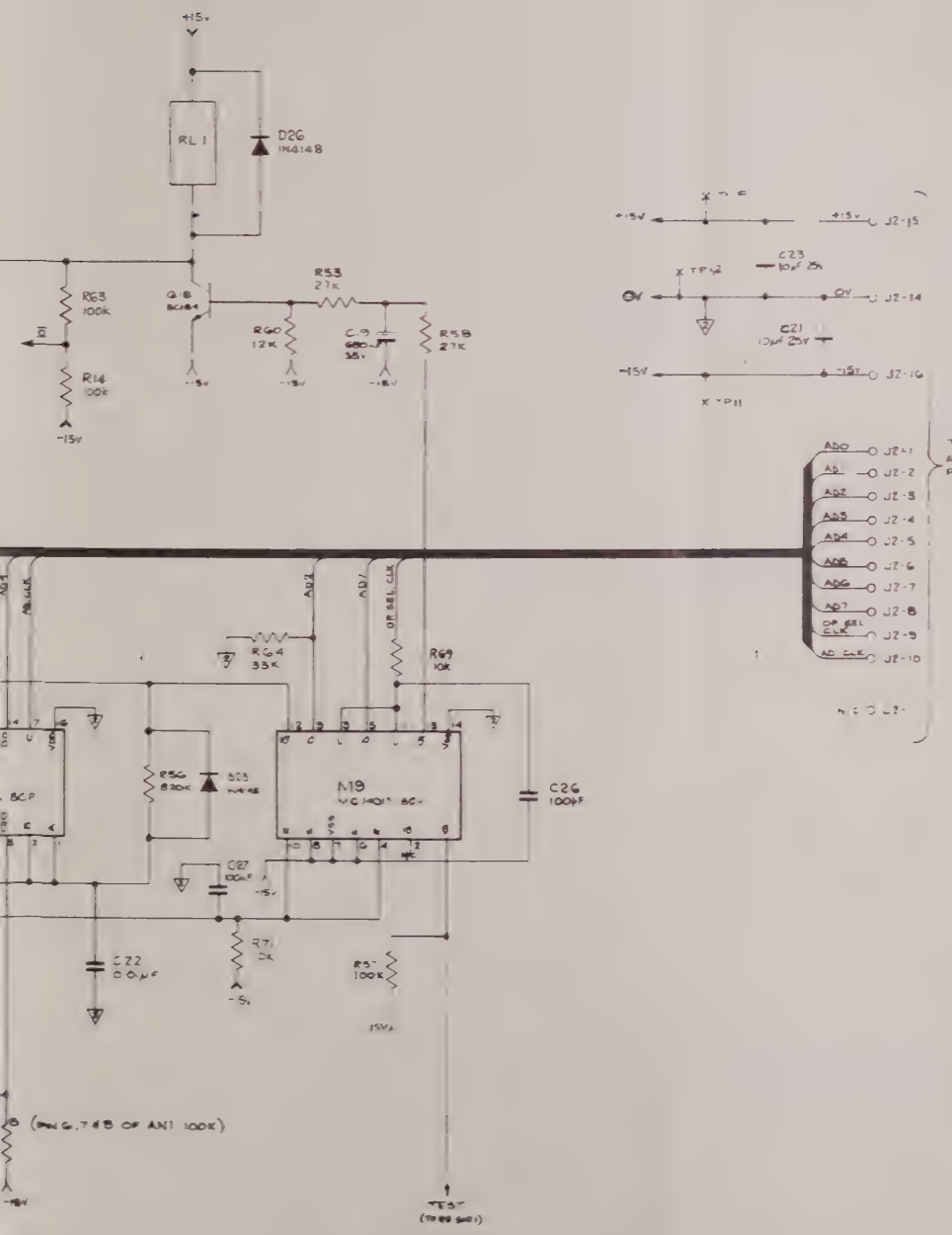
DRAWN	CHECKED	DIMENSIONS IN	TOLERANCES	ANGULAR ±
IL	RJ9	MILLIMETRES	INCH DIMENSIONS	
TRACED	APPROVED		DECIMAL TO 3 PLACES ±	005
		SCALE	DECIMAL TO 2 PLACES ±	010
DATE	DATE		FRACTIONAL ±	1/64
24 6 80		NOT TO BE SCALED	METRIC DIMENSIONS	
			DECIMAL TO 2 PLACES ±	1mm
			DECIMAL TO 1 PLACE ±	2mm
			WHOLE DIMENSIONS ±	4μm
			UNLESS OTHERWISE STATED	

5 | 6 | 7

ALL BURRS TO BE REMOVED

NOTES

	CHANGE
A	
1	RELEASED 1.6
2	SEE SHEET 1

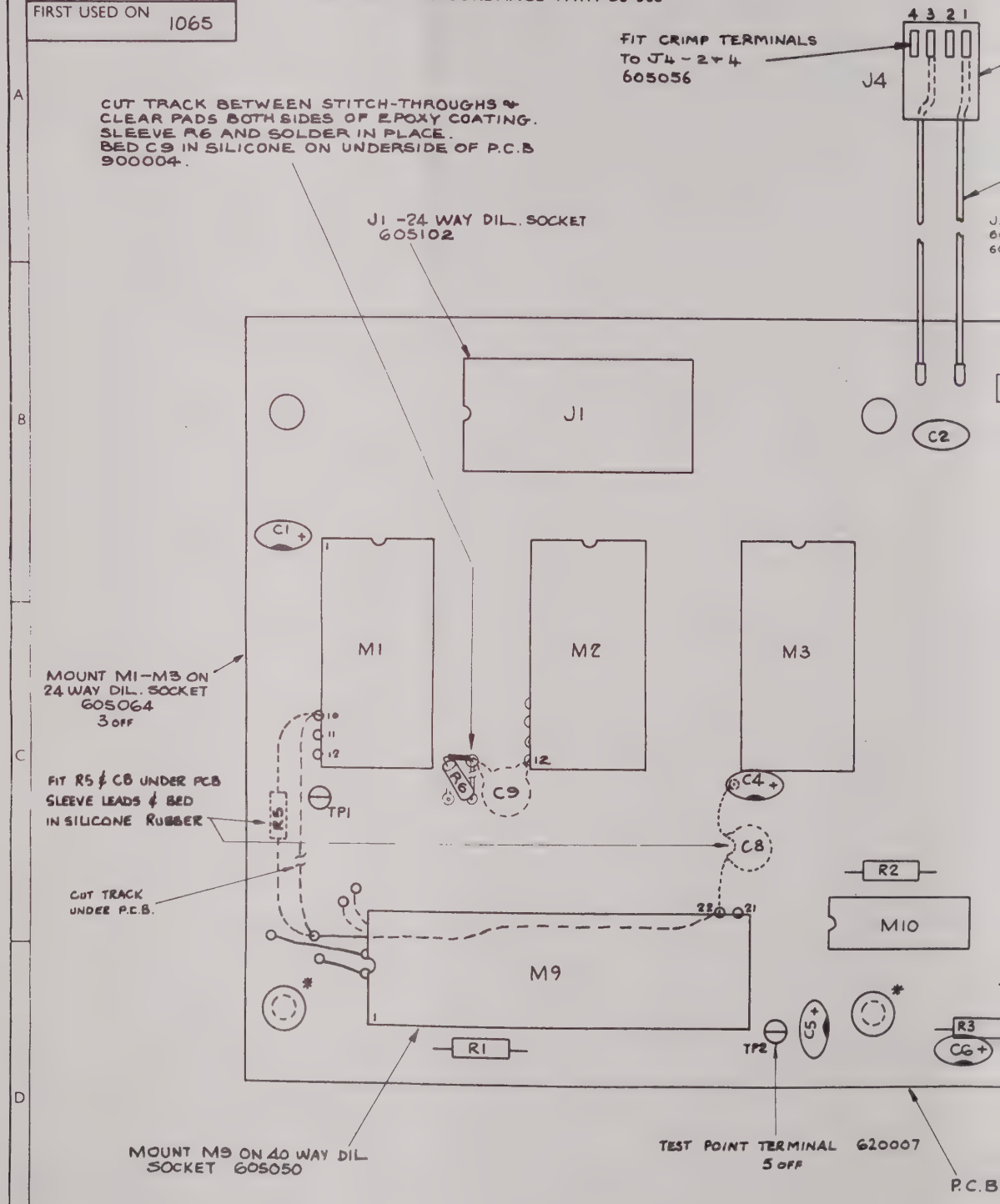


TERIAL	datron ELECTRONICS LTD. NORWICH.		DRAWING SIZE A1
	TITLE: OHMS PCB CIRCUIT 1065	DRAWING No: 430426	SHEET: 2 OF 2

DRAWING No.	FIRST USED ON
400427	1065

THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



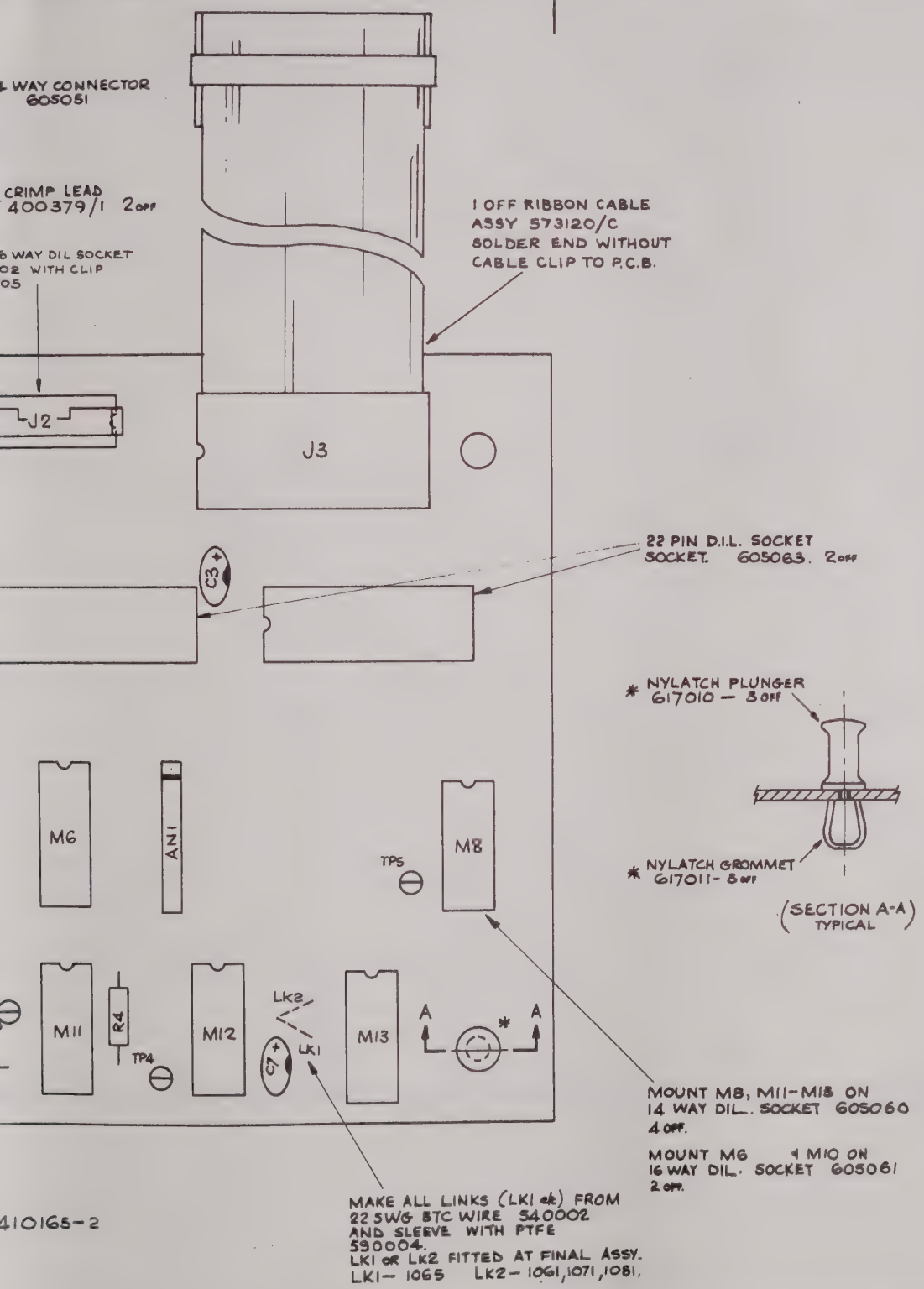
DRAWN	DATE	DIMENSIONS IN	METRIC DIMENSIONS	MATERIAL
	18.9.80	MILLIMETRES	ANGULAR ± ½°	
CHKD. D. King.	DATE 25/9/80	SCALE 2:1	DECIMAL TO 2 PLACES ± ·1mm DECIMAL TO 1 PLACE ± ·2mm WHOLE DIMENSIONS ± ·4mm	FINISH
APPD.	DATE	NOT TO BE SCALED	UNLESS OTHERWISE STATED	

4	5	6

ALL BURRS TO BE REMOVED

NOTES

ISS.	CHANGES
A	
B.	PCB. UPDATE TO ISSUE 2. M7 & LK2 DELETED J4 PIN Nos ADDED JR 26.11.80
1	RELEASED 18.12.80
2	ECO 1196 605056 CRIMPS ADDED TO J4 JR 25.2.81
3	ECO 1217 J3 WAS 24 WAY SOCKET. JR 18.8.81
4	ECO 1265 J1 WAS 605064 JR 3.12.81
5	E.C.O 1297. R6 & C8 ADDED 29.3.82 SJ
6	ECO 1347 R6 AND C9 ADDED JR 7.7.82
7	ECO. 1448 M4 AND M5 DELETED. JR 15.2.83


WAY CONNECTOR 605051
CRIMP LEAD 400379/1 2 OFF
6 WAY DIL SOCKET 02 WITH CLIP 05
1 OFF RIBBON CABLE ASSY 573120/C SOLDER END WITHOUT CABLE CLIP TO P.C.B.
J2
J3
22 PIN D.I.L. SOCKET SOCKET. 605063. 2 OFF
C3
NYLATCH PLUNGER 617010 — 8 OFF
NYLATCH GROMMET 617011 - 8 OFF
(SECTION A-A TYPICAL)
M6
AN1
TP5
M8
M11
R4
TP4
M12
LK2
C7
LK1
M13
A
A
MOUNT M8, M11-M13 ON 14 WAY DIL. SOCKET 605060 4 OFF.
MOUNT M6 & M10 ON 16 WAY DIL. SOCKET 605061 2 OFF.
MAKE ALL LINKS (LK1 etc) FROM 22 SWG BTC WIRE 540002 AND SLEEVE WITH PTFE 590004.
LK1 OR LK2 FITTED AT FINAL ASSY.
LK1 — 1065 LK2 — 1061, 1071, 1081.

410165-2

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DRAWING SIZE A2

TITLE IEEE PCB. ASSY. 1065. 1061. 1071. 1081.

DRAWING No. 400427

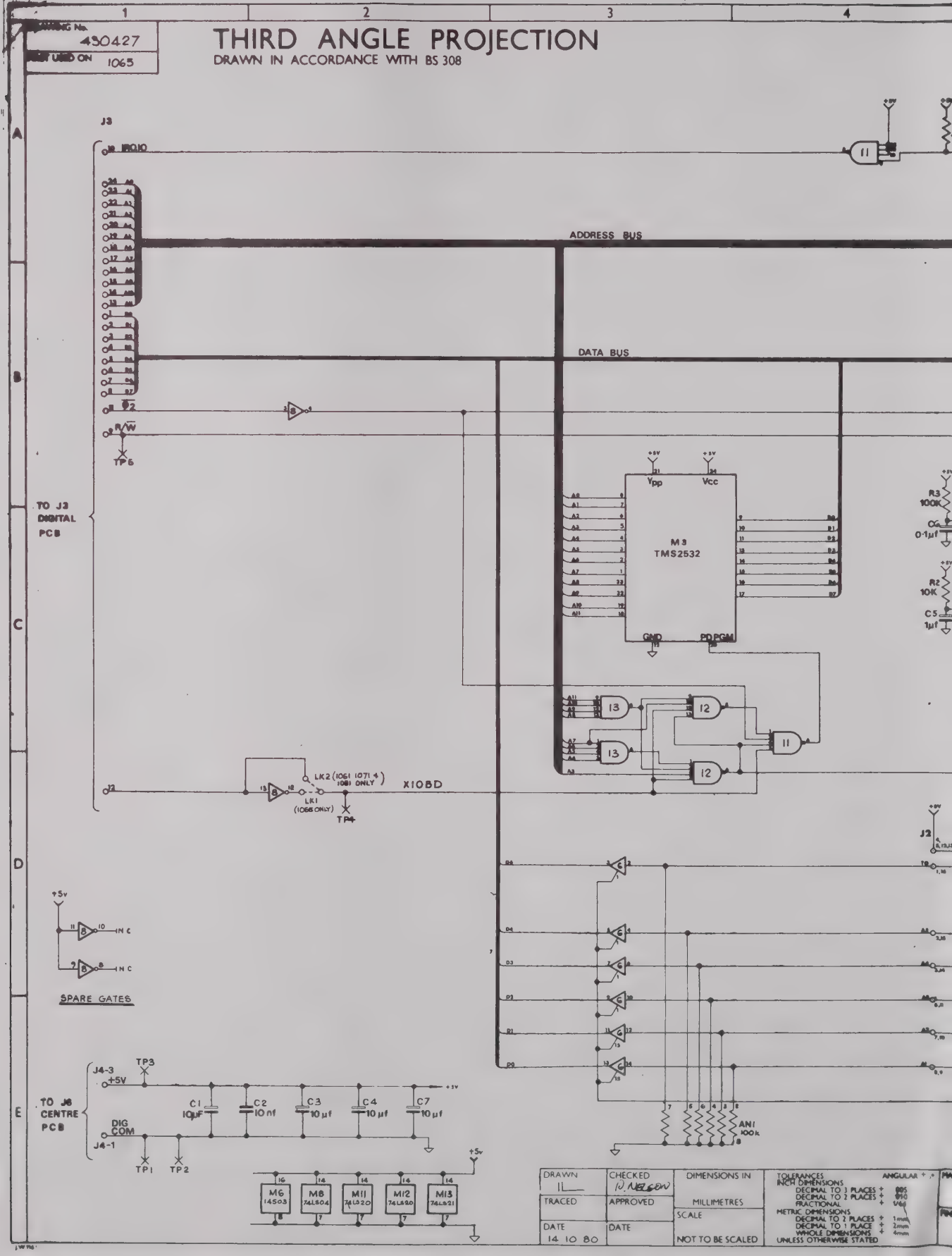
SHEET 1 OF 4

DRAWING No. 450427

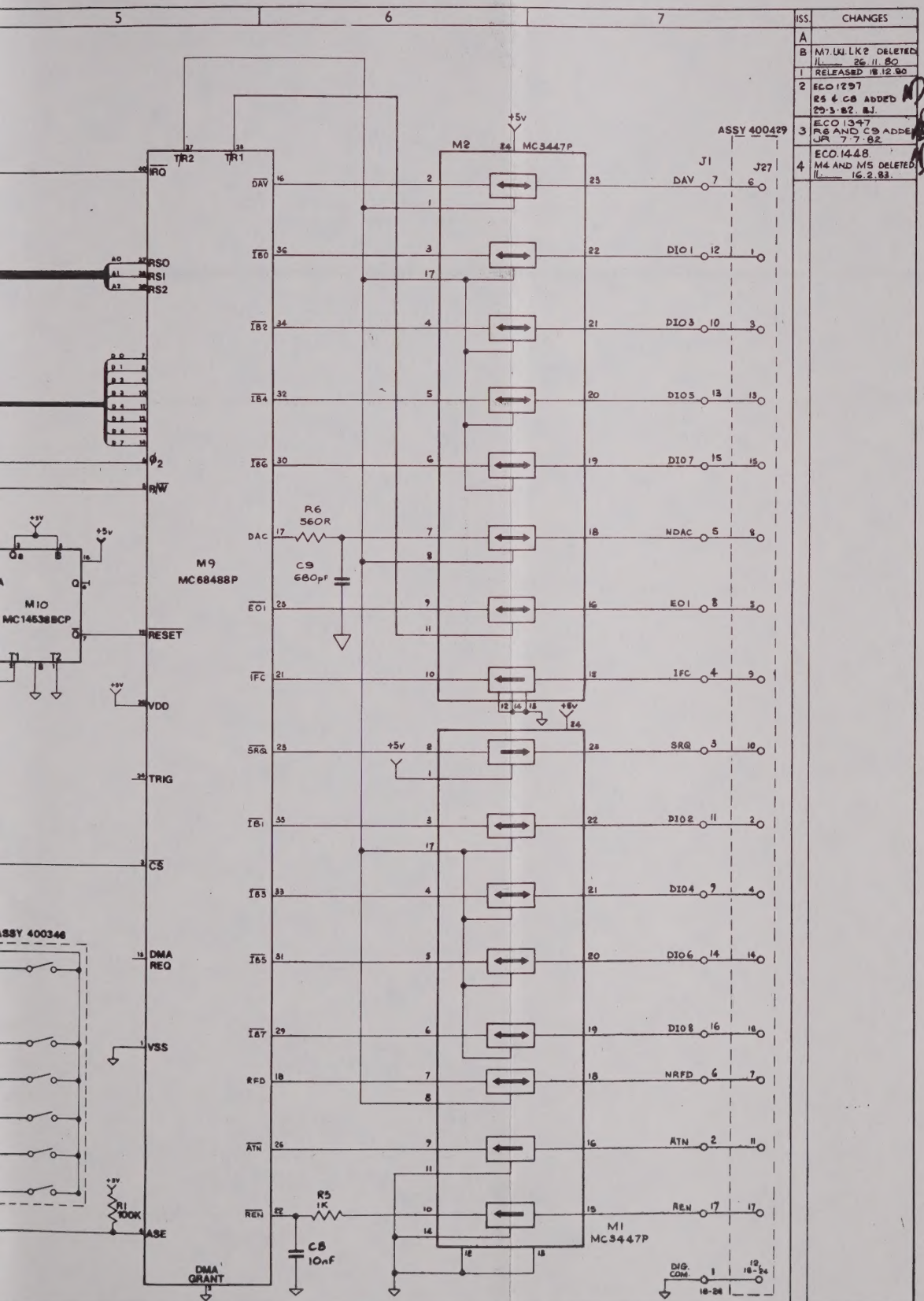
NEXT USED ON 1065

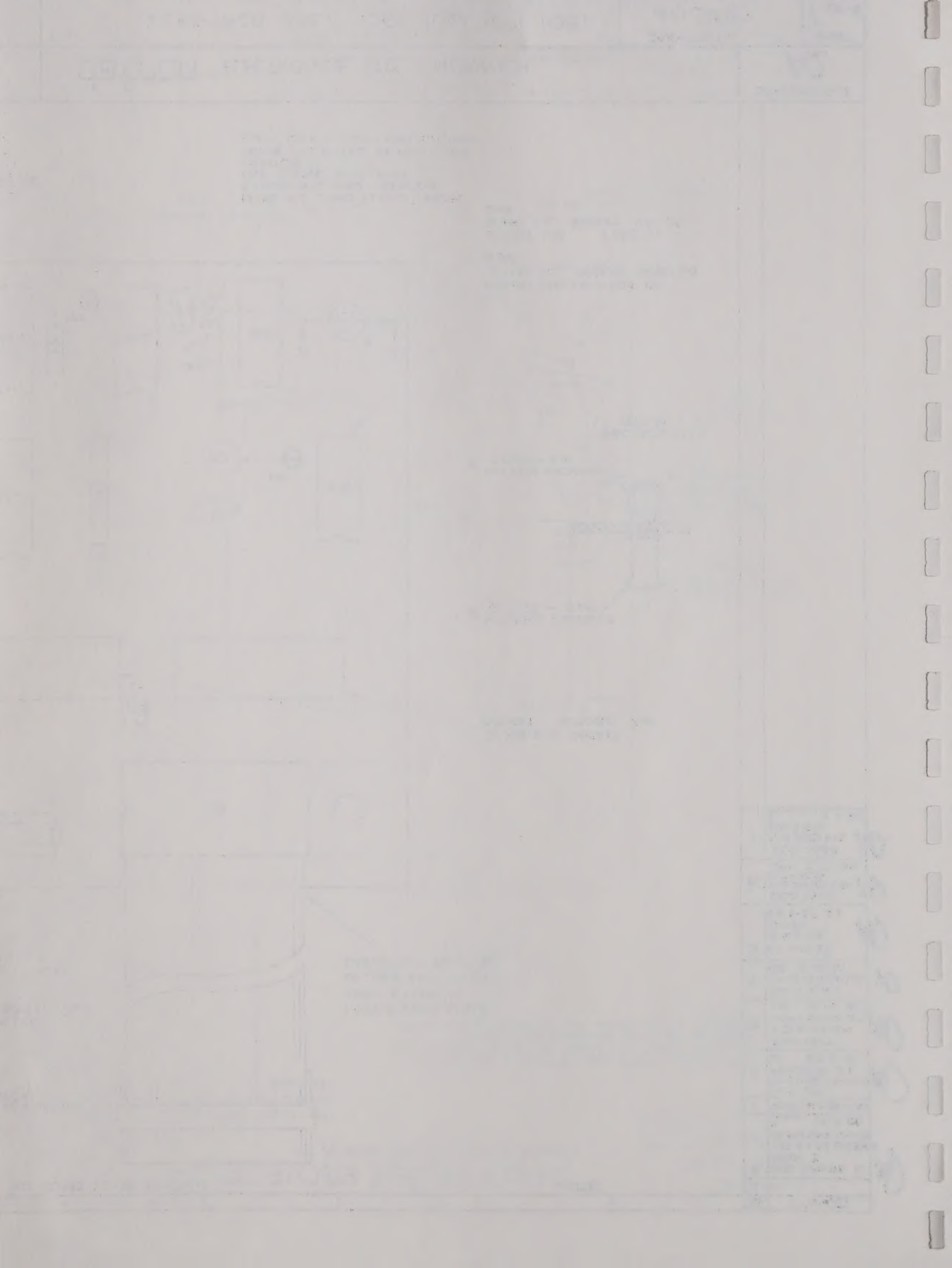
THIRD ANGLE PROJECTION

DRAWN IN ACCORDANCE WITH BS 308



DRAWN IL	CHECKED N. NELSON	DIMENSIONS IN MILLIMETRES	TOLERANCES ANGULAR + ° INCH DIMENSIONS DECIMAL TO 3 PLACES ± .005 DECIMAL TO 2 PLACES ± .010 FRACTIONAL ± 1/64 METRIC DIMENSIONS DECIMAL TO 2 PLACES ± 1mm DECIMAL TO 1 PLACE ± 2mm WHOLE DIMENSIONS ± 4mm UNLESS OTHERWISE STATED
TRACED	APPROVED	SCALE NOT TO BE SCALED	
DATE 14 10 80	DATE		


5
6
7
ISS.
CHANGES
A
B M7.LK1.LK2 DELETED IL 26.11.80
1 RELEASED 18.12.80
2 ECO 1297 R5 & C8 ADDED 29.3.82. BJ.
3 ECO 1347 R6 AND C9 ADDED JR 7.7.82
4 ECO.1448. M4 AND M5 DELETED IL 16.2.83.
ASSY 400429
M2 MC3447P
M1 MC3447P
M9 MC68488P
M10 MC14538BCP
J1
J27
+5V
R6 560R
C9 680pF
R5 1K
C8 10nF
R1 100K
DAV
DIO1
DIO3
DIO5
DIO7
NDAC
EOI
IFC
SRQ
DIO2
DIO4
DIO6
DIO8
NRFD
ATN
REN
DIG. COM.
IRQ
RSO
RS1
RS2
RESET
VDD
TRIG
CS
DMA REQ
VSS
ASE
DMA GRANT
ASSY 400346
datron ELECTRONICS LTD. NORWICH.
DRAWING SIZE A1
TITLE
IEEE 488 OPTION CIRCUIT DIAGRAM. 1065. 1061. 1071. 1081
DRAWING No. 490427
SHEET 1 OF 1



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